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ADDRESS AT THE ANNUAL GENERAL MEETING

of the Society, held on 16 June 1947, by the President

THE RIGHT HON. THE LORD RENNELL OF RODD,
K.B.E., C.B.

As IN PREVIOUS years, I begin my annual address by referring to certain grievous losses among the Fellows suffered by the Society. These have been particularly heavy in the sphere of academic geography. First and foremost was the death of Sir Halford Mackinder, who was a Vice-President from 1932–36 and a member of your Council for several years. Sir Halford Mackinder was the first Reader in Geography at the University of Oxford and may, I think, be regarded as the founder of modern geographical studies. In his death, not only the Fellows of this Society but all concerned with geography and its relation to world problems have suffered an irreparable loss.

Two other notable losses to geographical science during the past year have been Professor P. M. Roxby, who was the first Professor of Geography in the University of Liverpool, and Professor L. W. Lyde, for twenty-five years Professor of Geography in the University of London.

To these must be added Brigadier H. St. J. L. Winterbotham, for many years a distinguished member of Council and a holder of the Victoria Medal for his inventiveness in developing new methods of ranging and survey in the 1914–1918 war. He was for some years Chief of the Geographical Section of the General Staff, and subsequently Director-General of Ordnance Survey.

Another past member of Council who died during the year was Mr. C. W. Hobley, Official Member of the Legislative Council of East Africa from 1912–1920 and an authority on the Bantu peoples.

It is a pleasanter task to record that in the last Birthday Honours His Majesty was pleased to make awards to three officers of the Society. Our Honorary Treasurer, Lord Catto, becomes a Member of the Privy Council; our Foreign Secretary, Sir John Chancellor, receives the G.B.E.; and Mr. J. M. Wordie, Honorary Secretary, the C.B.E. for services to antarctic exploration.

The Society's premises are still, I regret to say, in a somewhat shabby state owing to the difficulties and cost of repairs; but a beginning has been made in outside re-decoration, and sundry works have also been done inside by the house staff. The most cordial thanks of the Society are again due to all the staff for their great and continuous work throughout the session which now comes to a close. The successful exhibition during the Christmas holidays on the history and technique of arctic travel, and the exhibition which has recently closed on the use of visual aids in teaching geography, have involved a tremendous amount of work by all those who helped to mount them but especially by the staff of the Society.

We thought that the Polar Exhibition at Christmas had been an outstanding success when 6041 Fellows and members of the public visited it. But these numbers were put completely in the shade by the more than 13,000 visitors to "The World in Focus" which, after remaining open for three weeks, closed on May 17. No less than 154 schools visited the exhibition as well as teachers and a number of foreign visitors. The new technique of visual aids in teaching, especially with pictorial and animated diagram films, has been a revelation to those unfamiliar with these developments.

Your Council proposes to continue exhibitions as part of the regular activities of the Society; but the work involved and the growing complexity of mounting will make it impossible to arrange for exhibitions as ambitious as the last two quite as frequently as I had hoped. Nevertheless, we hope to arrange exhibitions of this sort about twice a year and in the intervals perhaps to mount smaller exhibitions.

The Society's premises, in conformity with your Council's policy to utilize this building to the maximum advantage of geography as a whole, now houses, in addition to the Permanent Committee on Geographical Names, the Institute of Navigation, formed, so to speak, under the Society's wing. The Institute has as its main aims to unite all those concerned with or interested in the science of Navigation, including navigators, teachers, and workers in research and industry and to promote close contact with similar institutions abroad. It is thus intended to continue the coordination of work in navigation which was brought about by the war.

Another aspect of this policy of opening the Society's doors to all those working in geographical and related sciences has been the holding in your House during the past year of a number of official conferences, including the International Conference on North Atlantic Weather Ships, an International Conference on the distribution of the world's tin resources, and an International Conference on whaling and fisheries. In each case, His Majesty's Government have expressed considerable appreciation for the cooperation and hospitality accorded by the Council on your behalf to those attending these Conferences from many parts of the world.

The policy of your Council in geographical matters continues on the lines to which I referred last year, namely, to cover all spheres of geography, in the field, in the academic world, and in the drawing office. I trust that you will agree that the names to be proposed in due course for election to your Council this year will adequately reflect the activities of the Society in these directions. It is a matter of great regret to us that our two Trustees, the Marquess of

Zetland and Lord Biddulph, have decided that they can no longer continue to hold these offices. We regret their departure but understand their reasons. In their place are proposed Field-Marshal Lord Chetwode and Sir Charles Arden-Close whose names are so well known to you that no comment from me is required.

The Officers of the Council have pressed me to continue for a third year as President, which I do unwillingly owing to the lack of time at my disposal to devote to the Society. But I feel that the names of the Council which is shortly to be proposed to you for election justify me in continuing, since they include the names of many persons who will carry on the activities of the Society and relieve me of some of the work which I can find so little time to do. I trust that in putting forward this list I shall have the full support of Fellows when the time comes for the formal resolution to be proposed.

I very much regret the continued delay in catching up the arrears in publication of the *Journal*. I think you know the difficulties as well as I do. As soon as we thought to see some improvement, a further set-back has taken place. It is not only aggravating to you to receive the *Journal* so long after the period to which it refers, but administratively awkward for the officers of the Society.

In the *Journal* we are now trying to incorporate not only additional matter of current geographical interest but also academic news, notices of scholarships, and so on. I trust that those of you who are mainly interested in the academic side of geography will come to regard the *Journal* as an organ where such matters will regularly be announced and recorded.

In the fields of research and exploration, the Society's activities have been greatly developed through the energies of the committees of Council to which, as I said last year, wider powers and responsibilities have now been delegated. In order to handle the extended work of the Society, the number of these committees dealing with finance, research, publications, and the library and map collections has been increased by the addition of a Survey Committee which will work in close cooperation with the new Institute of Navigation, and of a Polar Committee formed jointly with the Scott Polar Research Institute at Cambridge.

The Research Committee, which also deals with expeditions, has been especially active. Your Council has accepted its recommendation to create a travelling Fellowship in geographical research. Grants have been made to expeditions working this summer in Iceland, in Jan Mayen Island, in British Columbia, and in Peru, as well as to research workers in the field in Great Britain.

In response to a large number of requests from ex-service men that the Society's Diploma in Survey should be revived, the Survey Committee with the Instructor in Surveying have drawn up a syllabus for a new diploma open to all students of survey which will be regarded by the Colonial Office as a qualification for those wishing to enter the Colonial Survey Service as survey probationers. It is hoped to hold the first examination in the spring of next year.

The remarkable revival of interest in exploration since the war, and especially in polar exploration, has fully justified the formation of the Joint

Polar Research Committee, under the chairmanship of Lord Wakehurst, whose chief concern has been the preparation, in association with Norwegian and Swedish scientists and with the scientific liaison officers of Australia, New Zealand, and South Africa, of preliminary plans for an expedition to western Queen Maud Land in the Antarctic.

You will remember that last year I referred to the Geographical Magazine Trust Fund for geographical exploration and research. You should know that in the past year the Trustees of this fund, on the recommendation of the Research Committee and of Council, have voted £2000 towards the expenses of the antarctic expedition to which I have just referred, a further £250 towards the Oxford Expedition to Jan Mayen Island, and £500 towards the travelling Fellowship in geographical research. I am sure that you will appreciate this very generous contribution by the Geographical Magazine Company and the Trustees towards geographical exploration and research.

As in previous years, the Society has been able to give considerable assistance in research matters to departments of His Majesty's Government, and our Map Room and Library, considerably enlarged through gifts and accessions, have been especially busy in dealing with inquiries from official and other sources. Owing to the general shortage of text-books and the recent large increase in the numbers of students and readers, the Library has been especially hard pressed. Some 5250 books were borrowed from the Library during the past year, compared with a previous figure of 4480, the weekly average being 101 books. The needs of many Fellows as regards copies available and the length of time they can be retained have, I know, not always been satisfied, but I hope that this situation will improve as new editions of standard works are produced.

I mentioned a large increase in the number of geographical students. In this connection, your Council has been paying special attention to the question of careers for geographers and to encouraging the employment of geographers in the many fields where their training should enable them to be of special service. In the Colonial Empire, and especially in Africa, there is and will continue to be an appreciable demand for trained geographers, and representatives of the Society have recently been considering this matter with officials of the Colonial Office.

The interests of the Society and the activities of geographers in general will find a focus this summer in the meetings of the Geographical Section of the British Association at Dundee, and it is a happy choice that Professor E. G. R. Taylor, our Victoria Medallist this afternoon, is President of the Geographical Section, and Mr. J. N. L. Baker, a Member of your Council, the Recorder of these meetings.

Frontispiece to John Dee's 'Pety Navy Royall,' 1577

Queen Elizabeth, Mistress of the Seas

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RICHARD HAKLUYT

E. G. R. TAYLOR

Joint Meeting of the Society and the Hakluyt Society, 4 December 1946

THE CENTENARY OF the Hakluyt Society calls us to remember and praise Richard Hakluyt himself. No memorial or monument was erected to him by his contemporaries. His grave is unknown save that he lies in Westminster Abbey, of which he was a prebendary. The tablet on the wall of Trinity Church (formerly St. Augustine's), Bristol, where he also held office, was placed there only in 1910.

Hakluyt was no figure of Elizabethan romance. Indeed, he must be confessed a mere armchair geographer, for he never travelled farther afield than Paris. Yet he would ride a couple of hundred miles over abominable English roads just to collect, or merely to confirm, one traveller's tale. All then that I have to tell you is the human story of a humane man; one who urged, in season and out of season, plans which had for their objective the social betterment of England.

If we examine the history of any new idea, new project, or new invention, we repeatedly find that three phases are discernible. At first the idea presents itself to a few exceptional minds, who revolve it and tentatively present it to the public, usually to be met with indifference and scepticism if not with active opposition. These thinkers and theorists nevertheless make a few converts, and these in their turn initiate the second phase. For by their enthusiasm and discussions, often too by daring but only partially successful experiments, they familiarize people at large with the novelty, and hence by degrees establish that "climate of opinion" within which the third phase becomes possible —namely, the general approval and execution of the project.

Translated into terms of English overseas expansion, we find in the first phase that Henry VIII, Wolsey, members of the More circle, and some others did realize the implications of the Discovery of America. But plans to take advantage of it (such as those of Thorne and Barlow) broke down under the dead weight of conservatism in Court and City. The second phase is associated with the names of statesmen like the Duke of Northumberland, of writers and thinkers like Richard Eden, Robert Recorde, and John Dee, and of pioneers like Chancellor, Gilbert, and Raleigh. But more than anyone it was Hakluyt who, by his vast assembly of 'The Principal Navigations Voyages and Discoveries,' succeeded in establishing that climate of opinion which fostered the third phase, the successful colonization of the seventeenth century which he just lived to see. As Professor Trevelyan has written,[1] "The most influential writer in the age of Shakespeare, if it were not Foxe the Martyrologist, was Hakluyt, author of *The Principal Navigations* . . . Hakluyt in narrating the

[1] G. M. Trevelyan, 'English social history,' pp. 192–3. London, 1944.

deeds of our explorers and seamen, directed across the ocean the thoughts of adventurous youth, of scholars, statesmen and merchants, and of all who had money to invest."

Who then was this man? What were his origins? How came he to devote his whole life to establishing the fame of others? The story begins just a year before Elizabeth came to the throne when a certain Richard Hakluyt, member of the Skinners' Company, died in London leaving a tribe of small boys and girls of whom our Richard was the third son, then four or five years old. The father in his Will commended the family to the care of his nephew, also named Richard Hakluyt, not long entered as a lawyer at the Middle Temple. Soon after, the mother died and the young lawyer, himself aged only twenty-five or so, took charge of his orphaned cousins. All did well, although the eldest boy died on reaching manhood. Oliver became a doctor, Richard a parson, while the melancholy dandy Edmond became tutor to the son of Lord Charles Howard of Effingham and on grand occasions wore a peach-coloured silk cloak lined with rich taffeta. This happy advancement was partly due to a benefaction of the Queen. In Camden's 'Annals' of her reign we read under date 1560: "The abbey also of Westminster she converted into a Collegiate Church; and there she instituted . . . a Dean, twelve Prebendaries, a Schoolmaster, an Usher [and] Forty Scholars called the Queen's Scholars, whereof six or more are preferred every year to the Universities." Young Richard became in turn one of the forty scholars, one of the six youths preferred to the University, and at long last one of the twelve prebendaries. His brothers shared the schooling and two of them the University life. If we ask how they came to be so fortunate, the answer seems to be not merely that the Skinners' Company kept a friendly eye upon them, but that the family came from the Welsh Marches where they had long been landed gentry, so that they were neighbours and connections by marriage of a host of people (such as the Crofts and Wigmores) in and about the Tudor Court.

Since Richard Hakluyt the lawyer was the formative influence in his young cousin and namesake's life, his own career is worth considering. His small manor of Eaton was close to Leominster in Herefordshire; and Leominster in Elizabethan England spelt the finest quality wool. It was therefore to be expected that the lawyer should be an expert on wool, woollens, and the wool trade, and that he should think largely in terms of wool as a means of countering the economic depression that had fallen upon this country in the middle of the century. Not only did he contribute advice on the search for new markets both in the east and in the west but he urged that more attention should be paid to the quality, dyeing, and finishing of English woollens designed for export. This would not only make them stronger competitors abroad and ensure better prices, but would increase the amount of skilled labour employed in their manufacture. His advice and plans are indeed constantly directed towards the expansion of employment. It was opportunities for work (he said) that the poor needed, not almshouses and hospitals nor money and lands bestowed in charity. Planning for full employment is not generally accepted as a policy even to-day: it was certainly an unfamiliar doctrine in Elizabethan times. Incidentally it is interesting to note that the lawyer's efforts to introduce new and better vegetable dyes for wool brought

him into contact with the great botanists of the day, Pena and Lobel, Charles L'Escluse, and Gerrard the herbalist. He gives us some valuable notes on how new flowers, fruits, and vegetables came into English gardens, from which it appears that tobacco was planted and used many years before the date which traditionally associates it with Walter Raleigh.

Although we know little of the elder Hakluyt as a practising lawyer, it is clear that he early won for himself a name as an industrial and business consultant and a useful man on Commissions. Since Lord Treasurer Burleigh too was consistently interested in the establishment of new industries in this country (although he never appears to have been very eager to promote overseas adventure) we are not surprised to find that the lawyer was sufficiently well known to him to be in a position to approach him directly in correspondence.

At that time there were three important groups of men, apart from statesmen, whose knowledge and experience were relevant to a planned expansionist policy. In the first place there was the strong English merchant colony resident in southern Spain: men who were not only familiar with Spanish methods of discovery and colonization but who had in many instances themselves crossed the Atlantic and lived and traded in Spanish America. Among these Hakluyt the lawyer had kinsfolk and correspondents who furnished material for his economic memoranda on the New World. Second, owing to the number of Flemish and Dutch business men passing to and fro between Antwerp and London, he was able to contact among others Abraham Ortelius, the leading cartographer and cosmographer of the day. Thirdly, among his English friends was the famous mathematician John Dee, who from 1553 onwards had been consultant for the Muscovy voyages and a passionate advocate of the foundation of a British Empire. Add to these that Adrian Gilbert was Hakluyt's neighbour in the Temple, while Humfrey Gilbert lived for a time in the New Inn just across the Strand, and we can readily imagine how the lawyer came to be in the very thick of new projects and was able to furnish Gilbert with material for the famous debate before the Queen and Privy Council on the relative merits of the rival Arctic Passages.

One day (probably in 1568) there came into his chambers the Westminster school-boy, Richard, to see his cousin and guardian. Books of cosmography and an unrolled world map were spread over the table and the boy's curiosity was roused. So the elder Hakluyt began to explain them, pointing out how the former idea of a Tripartite World had been altered by the new discoveries.[1] "He pointed with his wand (wrote Hakluyt long afterwards) to all the known Seas, Gulfs, Bays, Straits, Capes, Rivers, Empires, Dukedoms, and Territories of each part, with declaration also of their special commodities and particular wants, which by benefit of Traffic, and intercourse of merchants, are plentifully supplied." The boy received, in fact, a first simple lesson in economic geography. He was enthralled! There was nothing like this at Westminster School, where they stuck to the Latin Grammar. So we are not surprised to read further: "My cousin's discourse. . . . Took in me so deep an impression that I constantly resolved, if ever I were preferred to the University, where better time and more convenient place might be ministered for

[1] Richard Hakluyt, Epistle Dedicatory to 'The Principal Navigations,' 1589.

ke Island, Old Virginia, the site of one of Raleigh's ttlements, after a drawing by John White published eodor de Bry in his compilation 'America,' 1590

these studies, I would by God's assistance prosecute that knowledge and kind of literature."

As we know, two years later he did go to the University, as a Queen's Scholar at Christ Church, Oxford. It took him seven years to read for his B.A. and M.A. degrees, after which he was elected to a Studentship (equivalent to a Fellowship) of his College and was free to follow his bent. Meanwhile the Frobisher voyages were taking place and Richard Grenville and his associates were vainly seeking permission to enter the Pacific Ocean. The pirate Drake succeeded where Grenville failed and was away in 1577, carrying a copy of Willes' 'History of Travel' for leisure reading. Hakluyt took Orders, studied modern languages, and embarked on a course of omnivorous reading upon which he based his immensely popular lectures upon cosmography. At the University he made a host of useful friends, including Sir Philip Sidney, William Camden, and probably the Earl of Cumberland, later the patron of Edward Wright who did so much for the science of navigation. It is usually said that Hakluyt was the first to introduce geography to the University. As regards modern geography this is true, but over half a century earlier Henry VIII had established there a German cosmographer, Nicholas Kratzer, to teach "the Geography of Ptolemy and the Doctrine of the Sphere." Nothing came of this however but a few elaborate sun-dials. Oxford education did not embrace novelties. Hakluyt's excursions to London and Bristol in search of first-hand material were deemed to be eccentricities to be excused with a tolerant smile. Yet there was Ortelius to meet on a visit to London, Frobisher's Eskimo captives to be seen with their kayaks, Winter's men back from the Straits of Magellan, besides some disappointed emulators of Drake's robberies in Panama.

In the spring of 1580, both the elder Hakluyt and John Dee were engaged to advise on preparations for a new attempt on the North East Passage, and Hakluyt of Oxford decided to take a hand in the affair by writing secretly to Gerrard Mercator (no less eminent a cosmographer than Ortelius) for information about arctic topography. It was in this year that the Crown of Spain swallowed up the Crown of Portugal, so that the Empire of the "proud Spaniard" (for whom Hakluyt entertained a naïve and hearty Protestant hatred) was doubled. But this was also the year in which Drake came home with his stolen millions and his news of an undefended Pacific Ocean. The money lost by Court and City in Frobisher's mythical gold mines was forgotten and new plans went ahead, in particular those of Humfrey Gilbert for the colonization of temperate North America. This was the project with which young Hakluyt, like his cousin, particularly identified himself. He had no sympathy with piracy or treasure snatching, little indeed with the mere opening of new trade routes to profit the merchant class. In America he saw a temperate land which he estimated to be as large as all Europe, only six weeks' sail from our shores, and the Queen's by right of first discovery since the Cabots had sailed in the service of her grandfather. Here could be produced, by our own people on our own terms, all those essential commodities which we otherwise had to seek from foreigners—naval stores from the Baltic, olive oil and soap from the Mediterranean, currants and cotton from the Levant. All these could be denied us, whether by the King of Denmark, the

King of Spain, or the Grand Turk. Economic autarky was the answer. Even more fundamental, here was an outlet for the surplus population which had grown up as a result of our long, happy freedom from sickness and war. But overseas colonies would necessitate a great increase and movement of shipping and seamen. Valuable to the State as this would be, it would be accompanied by heavy loss of life unless the present navigation by rule of thumb was replaced by navigation soundly based upon mathematics.

Such were Hakluyt's ruling themes, expounded in the Dedications and Prefaces of his various collections of Voyages, of which the first appeared in 1582. For this work and for direct help to Gilbert, Sir Francis Walsingham, who viewed colonies as a happy expedient for putting the English Catholics at a safe distance, gave the young parson his first reward. Instead of joining his Oxford "bedfellow," Stephen Parmenius of Buda, in Gilbert's Norumbega, Hakluyt was to go to Paris as Chaplain to the English Ambassador. This was Sir Edward Stafford, who had a lovely and romantic wife, Douglas Sheffield, the sister of Lord Charles Howard of Effingham, about whom everyone was whispering. Had the Earl of Leicester really poisoned her first husband, Lord Sheffield? Had he actually married her, for undoubtedly she was the mother of his acknowledged son, the little Robert Dudley? However, Stafford did not seem to mind the gossip, and Hakluyt thought her everything that was admirable, for she was very kind to him. At the Embassy he had every opportunity for the work he loved. He gathered important information from the French King's Skinners about the valuable Canadian fur trade already established, he met the Cosmographer Royal and Jacques Cartier's nephew, and he found in Paris the exiled pretender to the Portuguese throne surrounded by historiographers, ex-governors, and sea captains of the Portuguese Empire.

Meanwhile Walter Raleigh had stepped into Gilbert's shoes, for Sir Humfrey's expedition had met disaster. As Camden reported [1]: "He was constrained to give over his enterprise, learning too late himself, and teaching others, that it is a more difficult thing to carry over Colonies into remote Countries upon private men's purses than he and others in an erroneous credulity had persuaded themselves, to their own cost and detriment." Raleigh therefore arranged with Hakluyt to set forth the whole argument for colonization afresh, with emphasis on it as a work to be undertaken by the Prince and by the State. The 'Discourse of Western Planting' was the outcome, a secret document read only by the Queen, Walsingham, and one or two others. In it Hakluyt stated more clearly and at greater length than before his thesis of overseas settlement as a means to full employment. Crime was the inevitable result of destitution, and could not be stopped or prevented by imprisonments or hangings. "Many thousands of idle persons are within this realm, which having no way to be set on work, be either mutinous and seek alteration of the State, or at least very burdensome to the Commonwealth, and often fall to pilfering and thieving and other lewdness, whereby all the prisons of the land are stuffed full of them, where they either pitifully pine away or are miserably hanged." Then too, "those outrageous daily and common piracies" for which "we and the French are most infamous" arose from

[1] William Camden, 'Annales' (1615–17), Booke III, Ann. Dom. 1583.

the same cause of unemployment, for they did not occur among the Spaniards and Portuguese whose seamen were fully occupied. Besides the economic arguments, the political advantages of an English America were fully set out: it would be a bridle on the King of Spain, it would increase our naval strength, and so on. Hakluyt was invited to present the 'Discourse' to the Queen in person, but although he was personally rewarded with the next prebend to fall vacant at Bristol, Elizabeth made no move to make the Colony a State enterprise. Virginia was born a feeble offspring and in a few years had faded away.

The Spanish War had begun, but Hakluyt, nothing daunted by seeming failure, had set to work by 1587 upon what was to become his major collection of documents and narratives, 'The Principal Navigations.' The Armada defeated, he escorted the Ambassador's wife home from Paris to share in the rejoicings. In 1589 his wonderful book was published and acclaimed, whereupon there followed a domestic interlude. Lady Sheffield presented him in 1590 with the country living of Wetheringsett in Suffolk, on his marriage to her namesake (so perhaps her god-child) Douglas Cavendish. She was the daughter of Richard Cavendish, a politician much about the Court, but also a mathematician and a friend of John Dee. He was the uncle of Hakluyt's close friend Thomas Cavendish, the circumnavigator who had brought home for him in 1588 the great Jesuit map of China and other treasures. The elder Hakluyt died just about this time, to be followed in a year or two by his nephew Edmond. Richard Hakluyt called his baby son by Edmond's name. Before the child was four years old it was motherless.

After this series of bereavements Hakluyt returned to his former occupations, and the result was the enlarged three volume edition of 'The Principal Navigations' published between 1598 and 1600. This was the work which a few years later the Governors of the East India Company ordered to be placed in their principal factory in India "to recreate the spirits of their servants." On one occasion, Sir Thomas Smythe is reported to have said the information it contained spared the Company £20,000; that is to say a whole venture was saved. The first volume was dedicated to Lord Charles Howard, victor over the Armada, upon whom Hakluyt urged once more the importance of training mariners in nautical science. More than a score of years earlier, Stephen Burrough, one of the first of the arctic explorers, had directed Hakluyt's attention to the care bestowed by the Spaniards upon the training and testing of their pilots, and he had ever since maintained an interest in their methods and studied their manuals. In 1581 he had even induced the newly knighted Drake to promise £20 annually and £20 for equipment to a learned man to read a course of mathematical lectures relevant to navigation. But the learned man (a friend of Hakluyt's) wanted £40 and the scheme fell through. In Paris he had heard a good deal about Peter Ramuz, who had left money for mathematical Readerships, and of course he knew of John Dee's efforts in the same direction expressed in his Preface to the 'English Euclid.' Walter Raleigh was sufficiently convinced to support the mathematician Thomas Hariot in his household, while later the East India Company (to which Hakluyt became adviser) engaged Edward Wright to deliver some lectures. But nothing was done officially. Both naval and merchant seamen continued to pick up their knowledge by apprenticeship or at their own expense for another century or

more. Hakluyt however never lost heart, and one of his last acts was to encourage a young private teacher of applied mathematics to edit a useful foreign text-book.

Meanwhile he accumulated preferments, here the chaplaincy of the Savoy, there a second country living, besides the coveted Westminster prebend from the Queen. After seven years as a widower he married a comfortable widow of fifty, a Mrs. Smith, who seems to have brought him some London property. Yet he still found energy to play an active part in the affairs of the new East India Company and of the re-founded Virginia Company: he even planned to go to America in 1606 as he had thought to do in 1583. But it was another half-dozen years before Jamestown offered a fit residence for an elderly parson, and by that time the impulse had evaporated. By then too another young clergyman had begun to immerse himself in cosmographical literature, to seek the company of travellers and seamen, to make the acquaintance of the new generation of colonizers. Hakluyt was pleased, and invited Samuel Purchas to his chamber at Westminster, showing him his still growing library, allowing him to transcribe the unpublished narratives of Hudson and his companions and even to examine the precious map of China and other rarities.

A few words are due to Purchas. It is to him that we owe the striking saying which all geographers should keep in mind: "History without that so much neglected study of Geography is sick of a half dead palsy." It was from a prose passage in Purchas that the dreaming Coleridge drew inspiration for his best known verse, beginning "In Xanadu did Kublai Khan a stately pleasure dome decree." It was Purchas who strove to record justly "in all this voluminous story" the good as well as the evil deeds of England's avowed enemies. I am sorry to find him misunderstood in our centenary volume, just as I regret what is there said about Raleigh. It was to Samuel Purchas, that most conscientious and hard-working man, that great lover of Geography, that the torch of Richard Hakluyt was handed on. "Yet shall his name live (he wrote of his great predecessor in 1617) while my writings endure. . . . And this is my epitaph to his memory, who had yet a better, his own large volumes, being the best and truest titles of his House." The torch was handed on, and through the Hakluyt Society we can keep it burning among us to-day.

DISCUSSION

Before the paper the PRESIDENT (The Rt. Hon. LORD RENNELL OF RODD) said: We meet this evening, as you know, to celebrate the centenary of the foundation of the Hakluyt Society. One hundred years ago the then President of the Royal Geographical Society presided over a small meeting of distinguished men of letters and science at the London Library. Out of that meeting there came the Hakluyt Society of which Dr. Lynam, who is on my right to-night, is President. The association of the Hakluyt Society with the Royal Geographical Society has throughout its history been close and intimate. The aims of both Societies are within the sphere of geography; many of the members who founded the Royal Geographical Society became foundation members of the Hakluyt Society. And now, after one hundred years of fruitful activity, the Hakluyt Society celebrates its Centenary. It is a comparatively rare event, even in this country, for a society to celebrate one hundred years of activity and production and still find itself active, fruitful, and unimpaired.

There is one very remarkable fact about the Hakluyt Society, which is that it has continued for one hundred years with the same subscription of one guinea. What has been raised continuously in that time is the quality of its productions and the value of them. That the subscription has never been raised is entirely due to the voluntary work of all those who have been its members and editors of its publications, among whom to-day perhaps none have contributed more than Professor Taylor and Dr. Lynam.

Professor Taylor then read the paper printed above, and a discussion followed.

Dr. EDWARD LYNAM: There is little I can add to such a lecture and one so characteristic of the lecturer, in which wide scholarship and apt wit have been so happily conjoined. Professor Taylor has given us a delightful lecture to celebrate the Centenary of the Hakluyt Society, and very fittingly has given it in the hall of the Royal Geographical Society. I must stress once more the great debt which the Hakluyt Society owes to the Royal Geographical Society. For one hundred years the two Societies have worked together, and I hope that for another one hundred years we shall work together still more effectively. Unfortunately the Hakluyt Society is not likely to be able to continue to produce two volumes such as we have produced every year for the sum of one guinea, although to avoid increasing the subscription we are trying to increase the membership of the Society. Everybody interested in the story of man's exploration of this world may join the Society; we ask but a small subscription and give very good measure.

I am the culprit referred to by the lecturer who depreciated Sir Walter Raleigh in the Hakluyt Society's centenary volume. Anybody who has read Hakluyt's 'Discourse of Western Planting' and realized how earnestly he wished to remedy unemployment, to save his poorer countrymen from vagabondage, to reform jailbirds, and to found a prosperous English colony overseas will know that he was a wise and disinterested patriot all his life. For him his country always came first, as it did not for Raleigh.

I have often speculated on the purpose of our Society. Are we geographers or are we, as a recent writer has suggested, historians? Since our central subject is this globe, on which all man's activities have been played out, it is true to say that our Society covers many branches of geography. Indeed we can claim that there is no branch of geography which our publications do not cover: social, historical, and political geography, intercourse by land and sea, the influence of climate and of environment, and the problems of navigation—all these we embrace. There is still so much to be learned about the world; so much that until quite recently officers in command of the ships of the Royal Navy were asking for the Hakluyt Society's publications to help them in their navigation, to mark where new currents set in, where certain winds were prevalent, where ice-floes drifted, and so on.

Yet our purpose is historical as well as geographical. We identify ourselves with man no less than with his environment. This is hardly the time to initiate a discussion on Professor Fitzgerald's letter in the May–June 1946 issue of the *Geographical Journal*, in which he attempted to define Historical Geography. But history is an attempt by a historian to identify himself with the men and women about whom he is writing, to *be* them and to see their problems as they saw them. The editors of our volumes do, in fact, what Daniel Defoe did when he wrote 'Robinson Crusoe'; but, unlike Defoe, they have to deal with real persons and actual events and they cannot solve problems as a novelist does for they cannot tamper with the truth.

We have here with us one who has been a member of the Society for well over

fifty years, who has been in turn a Member of the Council, Honorary Secretary, and finally President. Nobody is more fit to speak about the Hakluyt Society than Sir William Foster.

Sir WILLIAM FOSTER: I came here to-night knowing that I should be interested and instructed, but I did not expect to be so much amused as I have been by Professor Taylor's lecture; it was not only learned but witty.

I was interested in one remark Professor Taylor made, that Hakluyt was an armchair geographer: in other words, that he was an amateur. It interested me because I myself am an amateur. After all, to be an amateur is an English way; we are most of us amateurs really. Among our great soldiers, Marlborough, Wellington, Clive, all learned their strategy in the field and not in a staff college. Among our historians, Gibbon, Macaulay, and many others were not in any sense professionals. So when I hear the Hakluyt Society described as a body of amateurs I am not greatly disturbed. That is certainly not true of the direction. In our President, Dr. Lynam, our lecturer to-night, who is a Vice-President, and our Treasurer, Mr. Baker, we have three experts of the highest rank directing the Society.

If the Society is learned, it is not learned in the same sense as the Royal Astronomical Society or the Linnaean, which no one would think of joining unless he had expert knowledge of the society's subject. The Hakluyt Society appeals to men and women who love travel and like to read about it; not only travel of the present day but also travel in the past, with descriptions of countries as they were several centuries ago. In that respect it resembles its elder sister, the Royal Geographical Society which also, while not failing on the scientific side, makes its great appeal to the ordinary reader. That is why I should like to emphasize the plea made by Dr. Lynam for a larger membership of the Hakluyt Society which would encourage and help it to greatly extend its work and to produce the two volumes a year which have been the average since the Society started.

Mr. R. A. SKELTON: One of our evening papers recently described the Hakluyt Society as a learned body not given to social activities. It is consequently a rather unusual privilege to address a representative meeting of the members of the Hakluyt Society. Our two societies have one strong common characteristic to which reference has already been made. I mean the catholicity of their membership. Dr. Mill in his 'Records of the Royal Geographical Society' described its immediate predecessor, the African Association, as being remarkable in that it admitted to its membership ladies of distinction as well as noblemen and gentlemen and used their subscriptions to pay the expenses of exploration. To-day the Royal Geographical Society still, I suppose, uses the subscriptions of the ordinary member, the amateur, to pay the expenses of exploration; and the Hakluyt Society uses the subscriptions of the common reader to pay for the expert publications issued by it. Among its members you will find students, scholars, men of action, what I might call the air-borne as well as chair-borne geographers, and the Society can hardly hope equally to please all of them by each of its publications. That is one of the great problems facing a Society with so mixed a membership. I think to-night we have been shown by Professor Taylor how learning can be alive with wit, and how in the same way every kind of member can be satisfied by the publications of such a Society as ours.

The PRESIDENT: There is one point I want to raise in regard to what Sir William Foster said. He spoke of the amateur in geography—in the Royal Geographical Society and in the Hakluyt Society. I would add that the word "amateur" has many meanings. The original meaning, if I understand the

French, is a person who is devoted to somebody or something. When we claim the peculiar trait in our history of producing successful amateurs, do we not mean that we have produced people who are devoted to their ambitions, to their causes, to their sciences, and above all, as in the case of Hakluyt, to their country? If that is so we can without fear contemplate an increase in the membership of the Hakluyt and other such societies by more "amateurs."

In Professor Taylor we have a person such as I have in mind, one who has devoted herself to a number of interests beyond Hakluyt and geography. She is one of the best and certainly one of the most entertaining "amateurs" that I have had the pleasure of listening to.

Mr. E. W. Gilbert, who was unable to attend the meeting, sent us a written contribution to the discussion: In later life Sir Halford J. Mackinder often remarked that Richard Hakluyt was the first Oxford Reader in Geography and he himself was the second. He also made the abortive suggestion that the new Chair of Geography, established at Oxford in 1931, be called the Hakluyt Professorship (*Scot. Geogr. Mag.* 47 (1931) 321–2). It is easy to imagine Hakluyt's pleasure were he able to return to this world and to see not only the large School of Geography in his old University but also the many other Schools of the subject which now flourish in this country. Hakluyt himself stated that he gave public lectures at Oxford "to the singular pleasure, and generall contentment of my auditory."

In its prospectus the Hakluyt Society rightly states that many of the original narratives and translations of voyages and travels of the Elizabethan and Stuart periods are admirable examples of English prose at the stage of its most robust development. At the present time there are few British geographers, with the exception of Sir Halford Mackinder, who can write prose worthy of their Elizabethan forerunners. It is time to discard jargon and to attempt to recapture the virile and musical style of Hakluyt and his contemporaries. Perhaps the best way to achieve this is by constant reading of the volumes published by the Hakluyt Society. It is surprising that so few British University teachers of Geography have joined the Hakluyt Society, and it is to be hoped that, as a result of the Centenary, many teachers of Geography in schools and Universities will enrol their names as members.

Richard Hakluyt concerned himself with the politics of his day and proved that the study of Geography can benefit the State. It was therefore very right that Professor Taylor should have been asked to give the lecture. Not only is she a leading authority on the geographers of the Elizabethan period, but she is also one of the British geographers who have not been afraid to teach that modern political planning must be linked with geographical learning; like Richard Hakluyt she too has given counsel to the State.

EXERCISE MUSKOX

LIEUT.-COLONEL G. W. ROWLEY

Evening Meeting of the Society, 28 October 1946

IN CANADA a considerable amount of research in arctic technique was carried out during the war and new equipment was developed and tested. At the end of the war it was clear that much of the information so gained could be used in the development of the Canadian northern territories and that some of the equipment could be adapted to civilian needs. In particular it was thought probable that the Canadian Armoured Snowmobile, originally designed for a projected invasion of Norway, would be capable of winter travel in country which had previously been possible only for dog-teams; and that the transport of supplies by air, already familiar in the sub-arctic bush country south of the tree-line, could be extended to the barren grounds of the north by the use of war-time improvements in flying technique and navigation. The Canadian Government therefore decided that the Canadian Army, supported by the Royal Canadian Air Force, should carry out a long journey in north Canada to demonstrate that winter travel on these lines was now practicable in regions which had previously been considered inaccessible to mechanical transport.

The route chosen for exercise "Muskox" was Churchill–Eskimo Point–Baker Lake–Perry River–Cambridge Bay–Coppermine–Port Radium–Fort Norman–Fort Simpson–Fort Nelson–Edmonton, a distance of 2900 miles (Fig. 2). From Cambridge Bay a small party was to cross Victoria Island to Denmark Bay and back, making the length of the whole journey 3130 miles. The route fell naturally into three stages: the first lay north across the barren grounds to Cambridge Bay, the second west to Fort Norman mainly on the sea-ice of Coronation Gulf and the freshwater ice of Great Bear Lake, and the third south through bush country where travel is restricted to winter tractor routes, mostly cleared during the Canol construction, and to the Alaska Highway. By timing the exercise to start on February 14 and to end on May 5 it was expected that a wide range of weather conditions would be experienced, from typical arctic winter to the spring "break-up."

The Moving Force to undertake the journey was to consist of about fifty men in twelve snowmobiles under Lieut.-Colonel Patrick Baird, a Fellow of the Society. As the snowmobiles could carry sufficient petrol and supplies for limited distances only it was necessary to arrange the delivery of additional requirements *en route*. For this purpose No. 1 Air Supply Unit of the R.C.A.F. was formed under Wing Commander Jack Showler, a well-known bush pilot before the war, with five Dakota and three ski-equipped Norseman aircraft, later supplemented by two Dakotas, one Commando, and some Waco gliders from the United States Army Air Force. Until the Moving Force reached Cambridge Bay most of these aircraft were to operate from Churchill airfield. After Cambridge Bay they were to be based mainly on Yellowknife, Norman Wells, Fort Nelson, and Edmonton. As planning proceeded it

became evident that to allow the aircraft to operate with reasonable safety during the first stage of the journey it was necessary to construct an airfield and meteorological station at Baker Lake and a separate small force under my command was formed to do this. To arrange the forwarding of supplies and to administer these parties in other ways a base force under Lieut.-Colonel J. D. Cleghorn was established, first at Churchill and then at Edmonton with detachments at Yellowknife, Norman Wells, and Fort Nelson.

After preliminary training at Camp Shilo near Winnipeg, the Muskox personnel concentrated on 31 December 1945 at the old United States Army

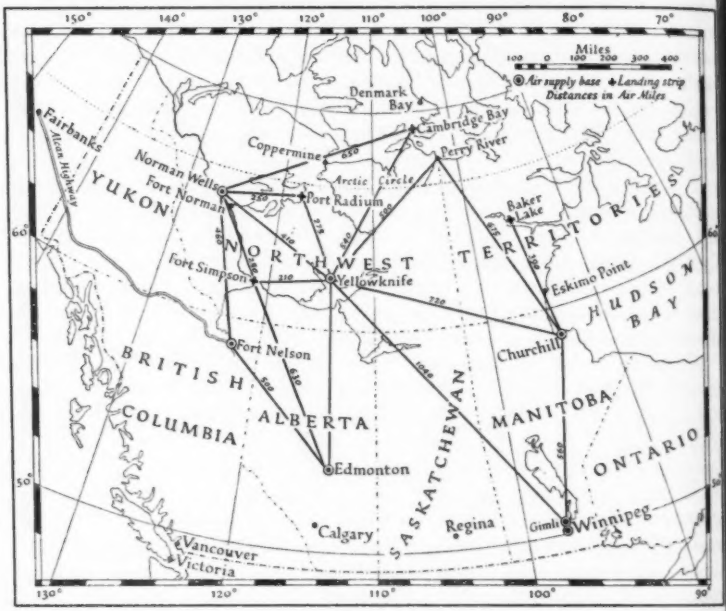


Figure 1

Barracks at Churchill for advanced training. As very few had had previous arctic experience they had to learn how to build snowhouses and how to look after themselves and their clothing at low temperatures. They also had to become familiar with their vehicles and carry out short practice journeys.

The Canadian Armoured Snowmobile was a fully tracked vehicle powered at the rear by a Cadillac petrol engine of over 100 brake horsepower with hydramatic transmission. The most conspicuous feature was the great width of the tracks—nearly 3 feet—giving a very low surface pressure so that the vehicle could move over soft snow without sinking deeply. The snowmobiles for the exercise had been modified considerably by cutting away the armour plating protecting the crew and replacing it by a roomy enclosed duralumin cabin, thereby increasing the carrying capacity and comfort without altering the overall weight.

Nearing Coppermine on the run from Cambridge snowmobiles towing sledges

The moving force camped on the sea-ice of Coronation Gulf

Phot. Nat. Film Board, Can

Settlement at Baker Lake

As the Baker Lake Force left Churchill before the Moving Force and I was most intimately connected with this part of the exercise I shall deal with their journey first. We were a small party of only eleven men: two driver-mechanics, a signaller, an ordnance observer, an R.C.A.F. airfield engineer, a meteorologist, two army and two civilian tractor operators, and myself. Seven of us rode in two snowmobiles, each of which had a tracked trailer of experimental design to carry extra fuel and our camping equipment. The other four operated two D-6 Caterpillar tractors fitted with angledozer blades and dragging in all four heavy freight sledges and a caboose. A caboose is simply a cabin mounted on a sledge which provides the arctic traveller with all the comforts of home. Our own caboose had a sleeping-bunk for the four operators and a coal stove which, as well as providing constant hot coffee, was indispensable for heating oil for the tractors, drying clothes, and thawing anti-freeze. With a caboose no time is wasted in making and striking camp, and the tractor operators, who spend long hours driving in the severest weather without any protection, richly deserve somewhere to thaw out after spells of driving. Because tractors will break through weak ice without warning no northern tractor operator will drive inside a cab which can so quickly become a death-trap.

As the tractors could haul more than our needs for the journey we were independent of supply by air. I intended that the snowmobiles, which were of course faster, should normally move ahead, finding the best route for the tractors and waiting for them to catch up every two days or so. We expected the journey to take a month and intended to leave as early as possible in January. We were delayed however waiting for towing winches for the tractors, an essential part of their equipment for this type of work, and it was not until January 24 that we crossed the Churchill River on our way north, passing to the west of Fort Prince of Wales, the starting point of Samuel Hearne and many other early travellers. For the tractors the first two days were among the most difficult as they included the short but steep passage of Sea-Horse Gully to Button Bay, followed by a certain amount of rough shore-ice. Sea-ice is rarely practicable for tractors and the experienced operator tries to follow the overflow ice. This is ice formed at high spring tides by water rising through the tide-cracks and freezing, forming a lane of smooth solid ice on which travel is perfectly safe. This lane is not however continuous and even when present is extremely difficult to locate and easily lost. It also lengthens the journey considerably as it meanders along the coast, and short cuts across points of land, however tempting, seldom prove worth while. Great care has to be taken at the mouths of rivers, though here the ice is sometimes thickened by river water which has burst out and frozen. Fortunately the civilian operator in charge of our tractor train had freighted by sledge along this coast before and on January 26 the tractors passed through North River, a small Chipewayan Indian village some 30 miles out of Churchill, where the snowmobiles were waiting for them. Leaving the last trees behind us at North River, the going as far as Nunnulla was rather slow and visibility often poor though never bad enough to prevent travelling at least part of each day. After Nunnulla both ice and weather were good. In this clear cold air we could see the tractors for many miles, the condensation

from their two exhausts appearing over the horizon like the smoke from a twin-funnelled steamer. On several occasions messages and letters were dropped to us by planes flying to lay a cache for the Moving Force at Eskimo Point. On February 1 we reached the mouth of the Thlewiaza River and met our first Eskimos whom we took for a short ride in one of the snowmobiles. Late the next night we drove into the settlement at Eskimo Point, the tractors arriving next morning.

Here we made the alarming discovery that the main spring of one of the tractors had broken and its whole weight was resting on a retaining bolt. I wirelessed the base at Churchill for a replacement to be flown to us as soon as possible but to our surprise the bolt held throughout the journey. This was very fortunate as my first mail at Baker Lake included a spare parts catalogue and a request for the correct description of the spring as they could not believe we really meant the main spring.

As we intended to leave the coast and travel largely over the great inland lakes for the rest of the journey, I engaged an Eskimo guide. Nigiak proved a first-class addition to our party, for, as well as knowing every feature of the country, he could show us—what was even more important—where the ice on the lakes froze late and was possibly unsafe for our heavy vehicles.

On February 4 we left Eskimo Point, where we had been the grateful guests of the Royal Canadian Mounted Police detachment, and cut inland along a chain of lakes to reach a small Eskimo camp at the south end of Maguse Lake. To save the trouble of pitching our tents we accepted the hospitality of one family and spent a crowded but warm night in their igloo. For the next two days the snow drifted badly, but with the help of our guide we made good time along Maguse and Kaminak Lakes to the Ferguson River, where we waited a day for the tractors. As Nigiak did not know the country to the north well, he arranged at a nearby camp for an old Igloolik Eskimo, Nauja, to take his place for the rest of the journey.

The next day we crossed the Ferguson River and travelled north on land towards Lake Kaminuriak. At dusk we were among rocks and all the next morning was spent in finding a route across two or three miles of stony ridges lying in our path. In the afternoon we had better going and we camped in a rising wind, certain that we were near Lake Kaminuriak. The wind rose higher during the night and the next morning the snow was drifting badly and it was bitterly cold. On starting the engines the generator and fan belts, brittle due to the low temperature, snapped and had to be replaced. When this was done we back-tracked for two or three miles hoping to pick up some landmark the guide could recognize, and so met the tractors following on the trail. The operators were driving without any protection straight into the gale with their faces frozen. As visibility was now reduced to nothing I decided to camp and wait for the storm to blow itself out. It blew hard for three days and travel was quite impossible. The only available thermometers were mercury and were frozen, but we found later that the temperature at Baker Lake at this time went down to −56° Fahrenheit and with us it was probably about the same. This unusual combination of wind and cold caused the severest conditions I have ever experienced. The morning of the fourth day the wind slackened a little and the tractor train shook off the drifted snow and set off

Preparing to refuel from a petrol drum just landed by parachute

On the sea-ice of Hudson Bay: overhead, a Norseman equipped with skis

Snowmobile wedged in a pressure crack near Port Radium,

The thaw; between the Petitot and Fort Nelson rivers

Snowmobile wedged in a pressure crack near Port Radium.

but after a few miles conditions again became impossible and it had to lie up for the rest of the day. Meanwhile the snowmobile crews were having great difficulty in starting their machines due to the cold and condensation in the electrical system, and it was only after working on them for nearly three days that we were able to follow the tractor party. However we had no more serious difficulties and caught them up the next night just south of the Kazan River where they were repairing a broken sledge runner. The following day, February 17, took us to the settlement of Baker Lake, the end of our journey, the tractors arriving fifteen hours later.

At Baker Lake we took over a building kindly placed at our disposal by the Hudson's Bay Company and immediately established a meteorological and signals station. Meanwhile, although vibration at low temperatures had broken the blade hydraulic system of one of the tractors, the other made such good progress in clearing the snow off the lake surface that by February 20 a strip 3500 feet long by 100 feet wide had been prepared and in the evening we watched anxiously as our first Dakota made a perfect landing bringing in supplies for the Moving Force. From then on aircraft landed whenever flying conditions were possible, and even after severe blizzards a few hours' work proved enough to clear the run-way.

Before returning to the Moving Force I will refer to the types of aircraft used. The Dakotas were the work-horses of the exercise and carried almost all the air freight. Even with extra long-range fuel tanks and emergency equipment their pay-load was from 4000 to 5000 lb., but being wheeled aircraft they were normally restricted to prepared landing grounds. The much smaller Norsemen, widely used in bush flying, were equipped with skis and could land and take off on lake surfaces, sea-ice, and almost any fairly level obstruction-free ground. They were used mainly for evacuating casualties, reconnoitring routes and delivering replacement parts to immobilized snowmobiles, and were a safety measure in case of accidents to other aircraft. The Waco gliders were not employed until the second half of the exercise, when they were very useful. They could carry heavier and more awkward loads than the Norsemen and were able to land in places impossible for ordinary aircraft. When the cargo was delivered they were recovered by being snatched off the ground by their tug aircraft. The Commando was used only occasionally, as it was not available at the beginning of the exercise. It carried a far greater load even than the Dakotas.

While the Baker Lake Force was *en route*, the Moving Force personnel completed their training and were ready to start on schedule on February 14 but bad weather delayed them at Churchill for one day. They were nearly fifty strong, made up of a large Canadian Army component with scientists and observers from various government departments and the United States and British armies. Besides drivers, mechanics, and signallers the service personnel included a medical officer, photographers,[1] and an air liaison officer. Among the scientists and observers were experts on arctic clothing and equipment, meteorology, magnetism, and navigation. The British Army observer

[1] All illustrations in this paper not otherwise acknowledged are Canadian Army photographs.

was Lieut.-Colonel Andrew Croft, a Fellow of the Society well known for his explorations in Greenland and Spitsbergen. The vehicles were eleven snowmobiles in three semi-independent divisions. The tracked trailers used by the Baker Lake Force had been found very heavy to pull and were discarded in favour of sledges. Each snowmobile drew two of these, one of an American and the other of a Canadian pattern.

On February 15 the weather cleared and the Force left Churchill in perfect conditions. Forty-three miles were covered during the day, mostly over the sea-ice in Button Bay, and at night the tents were pitched near the mouth of the Seal River. The next day the snow was drifting and travel was impossible, but the day after the snowmobiles made a good run to Nunnulla along the overflow ice. At Nunnulla, where a cache had been laid by air, two days were spent in servicing the vehicles and waiting for fine weather. The next day a start was made shortly after midnight by following in the dark the tracks left by the tractors nearly three weeks earlier. Travel was continued throughout the day. A Dakota dropped five drums of petrol just before noon and at night the force arrived at Eskimo Point, having covered nearly 100 miles in the twenty-four hours.

From Eskimo Point to Baker Lake the Moving Force largely followed the route of the earlier party except between Lakes Kaminak and Kaminuriak where they took a more westerly course. Rough country and stormy weather caused slower going than had been expected and the force was several days behind schedule when it arrived at Baker Lake on the night of March 1. Here it had been intended to increase the force to twelve snowmobiles by taking over one of my vehicles but, as their machines had been towing greater loads than they had been designed to, petrol consumption had proved higher than estimated and it was decided instead to reduce the force to ten machines in two divisions of five each.

After four days spent in maintenance and reorganization the force left Baker Lake on March 6 and travelled up the Thelon Valley, south of the river to Schultz Lake. They then took a more northerly direction towards Lake Macdougall on Back's Great Fish River along a route reconnoitred for the first few miles by Norseman from Baker Lake. The country they were now entering is probably the least explored area of the Canadian mainland, and there has been only one recorded journey down Back's Great Fish River, that of James Anderson in 1855, since its original discovery by Back in 1834. As the force pushed inland towards the watershed between the Thelon and Back Rivers, the terrain became more difficult and they drove through snow-covered gorges and up and down steep hillsides until about 40 miles from Back River where the going improved. The river was crossed on March 9 and beyond were a few miles of boulder-strewn ground which caused great difficulty and smashed several of the sledges already weakened by rough going. Soon after however a succession of lakes and rivers in rolling grassland sparsely covered by snow led down to the Arctic Ocean at Perry River. The trading post here is run by an Eskimo and the force's arrival was very opportune as a four-year-old boy was extremely ill. The medical officer diagnosed his complaint as acute appendicitis with pneumonia and other complications and decided to operate immediately. The operation was successful and the medical officer

130°
125°
120°
Amundsen
Gulf
Dismal Lakes
Great
Bear
Lake
Mackenzie
River
Petitot R.
Fort Nelson
Grande
Prairie
A L B E
115°

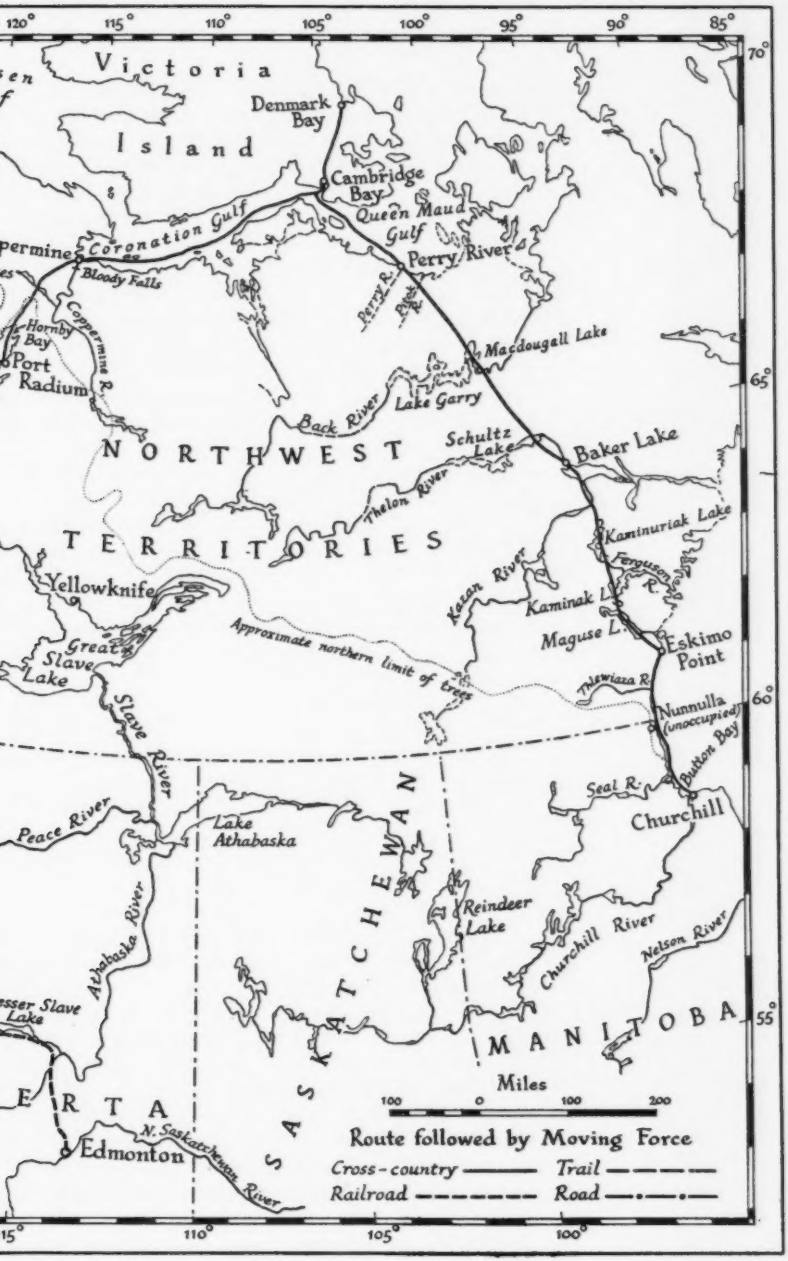

120°
115°
110°
105°
100°
95°
90°
85°
70°
65°
60°
55°
Victoria
Island
Denmark Bay
Cambridge Bay
Queen Maud Gulf
Coronation Gulf
Perry River
Perry R.
Bloody Falls
Coppermine R.
Hornby Bay
Port Radium
Macdougall Lake
Lake Garry
Back River
NORTHWEST
TERRITORIES
Schultz Lake
Baker Lake
Thelon River
Kaminuriak Lake
Ferguson R.
Kazan River
Kaminak L.
Maguse L.
Eskimo Point
Yellowknife
Great Slave Lake
Approximate northern limit of trees
Tadewiaza R.
Nunnulla (unoccupied)
Button Bay
Seal R.
Churchill
Slave River
Peace River
Lake Athabaska
SASKATCHEWAN
Reindeer Lake
Churchill River
Nelson River
Athabaska River
Slave Lake
MANITOBA
Miles
100 0 100 200
Edmonton
N. Saskatchewan River
Route followed by Moving Force
Cross-country
Trail
Railroad
Road

Figure 2

remained behind to evacuate his patient by Norseman to hospital at Aklavik, subsequently rejoining the force.

Up to Perry River the force had been steadily dropping behind schedule so they stayed only long enough to fit twelve new sledge runners and then set off along the good sea-ice of Queen Maud Gulf. Conditions were excellent and instead of the expected six days they arrived at Cambridge Bay in two.

Here they met Inspector Larsen and his crew who were wintering with the *St. Roch*, the ship in which he has twice navigated the North West Passage. Lying on the beach were the remains of Amundsen's schooner, the *Maud*, of North East Passage fame. She had been bought by the Hudson's Bay Company and employed as a freighter until her days of usefulness were over. The force had to remain at Cambridge Bay for some days while the air force and army bases were switched from the east to the west for the remainder of the journey, and during this period three snowmobiles set out on the trip across Victoria Island to Denmark Bay. The whole country was low-lying with a much thicker snow cover (averaging about a foot) than on the mainland, and the 240 miles there and back were covered easily without incident in four days including a twenty-four hour stay at Denmark Bay for magnetic observations. At Cambridge Bay the ice was blown clear of snow and Dakotas were able to land on wheels. In this way it was possible to bring in new sledges to replace those already damaged beyond repair, and the force left on March 23 well rested and in good shape.

The days were now lengthening rapidly. Though there was a certain amount of pressure ice in Coronation Gulf it was possible to average about 60 miles a day on the sea-ice and Coppermine was reached in five days. While at Coppermine, Baird and a small party reconnoitred the route to Port Radium by Norseman. Here the force was joined for the next stage of the journey by two other Fellows of the Society, Colonel J. T. Wilson, who as Deputy Director of the exercise had been mainly responsible for its planning and organization and who read a paper to this Society in 1942 on Samuel Hearne's route to the mouth of the Coppermine River, and Mr. T. H. Manning, whose experience of travelling in the Canadian Arctic is unequalled and whose explorations in Hudson Bay and Foxe Basin have formed the subject of several papers in the *Geographical Journal*.

After a day's delay due to weather the force left Coppermine on March 31 and headed south-west, passing Bloody Falls where in 1771 Samuel Hearne watched his Indians massacre an Eskimo camp of women and children. Soft snow and steep, rocky hills made travelling conditions difficult and they camped after covering 37 miles of rising country. The following day was lost due to a blizzard, but both weather and terrain improved on April 2 and they camped that night at Dismal Lakes. During the descent from there to Great Bear Lake the force followed high ground wherever possible to avoid the deep snow and dwarf willows in the valleys, finally passing through a belt of spruce—their first trees since leaving Churchill—to reach the lake at Hornby Bay. Apart from a few pressure ridges the ice on Great Bear Lake was in perfect condition and the force made good time until, within 2 miles of the El Dorado Mining Company's camp at Port Radium, one of the snowmobiles broke through the ice at a pressure ridge. It heeled over but jammed between

the sides of the crack and the crew were able to get out safely. In order to recover the vehicle a wireless message was sent to Port Radium for a tractor which arrived very quickly but in crossing the crack it too broke through, toppled over backwards, and pinned the driver under the water. An attempt was made to haul the tractor out but it sank carrying the body of the operator with it. Next day, April 5, by means of another tractor with block and tackle the snowmobile was dragged out of the crack and the sunk tractor was also recovered.

Three comfortable days were spent as the guests of the mining camp at Port Radium while maintenance of the vehicles was carried out in preparation for the next stage of the journey. In particular much work was necessary on the pneumatic tyres of the bogie wheels inside the tracks; hitherto they had been frozen solid, but now the temperature was rising sometimes to above zero and it was necessary to keep them inflated to the correct pressure.

The first two and a half days after leaving Port Radium were again over the good ice of Great Bear Lake, pressure ridges being bridged by 10-foot lengths of timber. Now that the force was south of the tree line, cross-country travel was no longer possible and they were restricted to tractor routes and lakes. From Great Bear Lake they followed a tractor road running west parallel to Great Bear River; an unfinished stretch of 13 miles took nine hours to pass, but the rest of the route was clear and Fort Norman on the Mackenzie River was reached on April 11. Two days were spent here in maintenance and reorganizing loads as it had been decided that the snowmobiles should haul only one sledge each for the rest of the journey.

By this time the weather was causing anxiety. Spring had set in much earlier than normal and there were signs of an unusually early "break-up." If the large rivers lying across the route broke before the force reached them, they would be cut off and unable to complete the journey. They had therefore to push on with all possible speed down the tractor trail from Fort Norman. This trail had been cleared during the building of the Canol pipe-line from Norman Wells to Whitehorse but it had fallen out of use and was becoming overgrown. It did however afford a practicable route south though it is of course a winter road only with no bridges. The warm weather caused very heavy going which resulted in a certain amount of engine trouble. Two vehicles were usually sent ahead to break trail for the others and the force started travelling by night instead of by day. In this way they crossed the Mackenzie to Fort Simpson by April 20, a day when in fact the temperature did not fall below freezing point even at night.

Leaving Fort Simpson the force crossed one of their biggest obstacles, the Liard River, just in time. The water on the ice was over a foot deep and a day or two later the crossing would have been impossible. On the south side of the river its smaller tributaries were crossed safely though in water up to 2 feet deep. But it was at the Petitot that most trouble had been expected. Here a small advance party from the force with an amphibious "weasel" (a small tracked vehicle) had landed by glider and constructed a corduroy road over the rapidly thinning ice. This consisted of small timber spikes together with planking running the length of the road. By the time the force arrived the current at the sides of the river was already washing away the

A 'corduroy' road of logs across rotting ice on the Petitot River

rossing the Fort Nelson River on a raft of petrol drums lashed to a pole amework

timber at both ends, but they again managed to cross just in time, the ice in the river actually beginning to break up as the last snowmobiles were crossing. The snow had been rapidly disappearing and by now there was very little left except where deep drifts had formed during the winter. Two small timber bridges, built by the bridging party over small rivers, were crossed without difficulty. In many places the trail was blocked by fallen trees or new growth which had to be cut away and cleared. Early in the morning of April 27 the last major obstacle, the Fort Nelson River, was reached. It was blocked by ice, most of which moved out during the morning, and was much too deep to be forded and the water was rising rapidly. It was decided to cross the river by raft at a place where it was divided by a sand spit, and a message was sent to Fort Nelson on the other side for a D-6 tractor to assist. Meanwhile 38-foot lengths of timber, 4–6 inches in diameter, were cut down and aircraft dropped forty empty 45-gallon petrol drums and several coils of 1-inch rope. The raft was a platform 38 feet long by 20 feet wide formed by cross timbers lashed and spiked on to nine lengthwise timbers or stringers to which four rows of empty petrol drums were lashed. The amphibious "weasel" swam across the river with the rope. The tractor then hauled the snowmobiles one at a time on the raft across the river to the sand spit. Next day the other half of the river was crossed and the force reached the far side in safety. The tractor trail for the remaining 24 miles to the Alaska Highway was very badly cut up and coated with mud which blocked the snowmobiles' tracks. Often timber had to be laid on the trail to give traction and one stretch of 5 miles took four hours to cover. But the distance was not great and on the night of April 29, only five days later than scheduled, the force reached Fort Nelson on the Alaska Highway.

On May 1 they set out again with a clear run ahead to Edmonton. On the first day 159 miles were covered, but an unexpected trouble arose. Dust and sand from the highway surface made their way into the engines and acted as abrasives. Oil-bath air filters were fitted, but after a further 200 miles on the highway engine failures were becoming frequent. The object of the exercise had however already been accomplished and to save the trouble and expense of extensive engine replacement at this late stage it was decided that the journey should end at Grande Prairie. Here the snowmobiles were loaded on to a special train which quickly covered the remaining 250 miles and brought the force to Edmonton on May 6, one day later than the date planned in Ottawa eight months before.

The fact that a journey of nearly 3000 miles was accomplished so nearly as planned, although no comparable journey had ever before been carried out, justified the faith the Canadian authorities had placed in their equipment and should do much to dispel the belief that development in the Canadian Arctic is impracticable. In this paper I have not been able to give full credit to the constant and invaluable support of the R.C.A.F. in delivering supplies of all kinds throughout the exercise. This entailed long flights in all sorts of weather conditions and often across unmapped country and no praise can be too high for the pilots and their crews. I have also said very little about the scientific programme of the exercise. At every opportunity, and often under

unpleasant conditions, the scientists were busy collecting data and carrying out experiments the results of which will be published in various technical journals in due course.

In conclusion I must express the gratitude of everyone who took part in the exercise for the hospitality and kindness shown to us by all the residents in the north and especially by the Hudson's Bay Company in all their posts, the Royal Canadian Mounted Police, the El Dorado Mining Company at Port Radium, the Imperial Oil Company at Norman Wells, the various missions, and of course the Eskimos.

DISCUSSION

Before the paper the PRESIDENT (The Rt. Hon. LORD RENNELL OF RODD) said: We have pleasure in welcoming to-night as our guests the Canadian High Commissioner, Mr. Frederick Hudd, and the Chief of Staff of the Canadian Military Headquarters. We also have with us Dr. Carl Mannerfeldt, who is on a visit to us from Sweden to see cartographical work in this country.

The paper by Colonel Rowley will be given you on behalf of all the participants in "Exercise Muskox." Colonel Rowley is himself an arctic explorer of considerable experience. He was with the British Canadian Arctic Expedition in 1936, and in 1936 and 1937 carried out some interesting work in Foxe Basin. He returned to the Arctic in 1938 and crossed north Baffin Land by a new route. It is through the kindness and assistance of the office of the High Commissioner in London and of the Canadian civil and military authorities that Colonel Rowley has received permission to delay his return to Canada to read his paper to the Society. You will thus have at first hand the experience of an officer who took part in the Exercise. We are very grateful to the Canadian authorities for having given us this opportunity.

Colonel Rowley then read the paper printed above, and afterwards replied to a number of questions.

Colonel ROWLEY: Dakotas fitted with skis were tried out at Churchill before the exercise and proved quite successful. They were not employed during the exercise because it is impossible to take off from a concrete run-way on skis and our supplies came from ordinary airfields; the use of skis also reduces the payload.

Rubber tyres inside the tracks of snowmobiles are not necessary in arctic winter conditions and it does not seem to matter whether they are pneumatic or not because in any case they are frozen. However they do minimize bumping when travelling over rocks and other kinds of hard going.

As yet little has been done with regard to mechanical travel in the Canadian Arctic in the summer months. The problem is that about two-thirds of the land surface is lake and river and much of the rest is swamp or *muskeg*. It is very difficult to construct a vehicle that will not sink into swamp. In fact, any vehicle designed for cross-country travel during the summer must be amphibious.

The position in regard to maps of north Canada changed a good deal during the war. Previously the Northwest Territories was mapped on a scale of 60 miles to the inch. During the war a fine series of maps at 8 miles to the inch was produced covering the whole of the Northwest Territories. Some of the maps were largely blank because there was no knowledge of the country; others were filled in by means of air photography. We used these maps a good deal, especially along the coast, which was well marked. A lot of work is still being done so that

one day the whole of the Canadian Arctic will be mapped in detail on the scale of 8 miles to the inch.

A great advantage of travelling with tractors instead of snowmobiles is that each can drag a number of freight sledges, to a total weight of over 50 tons in good going. Our Caterpillar tractors did about a half mile to each gallon of fuel. They can therefore carry a useful pay-load over a great range.

The sledges we used were wooden and were of the bobsleigh type. The two pairs of runners were connected by cross-chains and the body of the sledge was fitted with rockers mounted on large wooden bunkers between the runners. Metal sledges were not used during the exercise, though the runners were of course shod with metal.

Notes were made of the flora and fauna seen during the exercise and will be published later. During supply flights the Air Force was able to obtain valuable data about the migration of the caribou. On the Baker Lake Force we saw caribou, wolves, arctic hares, foxes, and lemmings, and quite a number of birds.

The PRESIDENT: I feel sure you wish me to thank Colonel Rowley on your behalf for a remarkable account of a very remarkable enterprise. Again we have had testimony of the value of work done during the war to the purposes of peace. I ask the Canadian High Commissioner to be good enough to convey our thanks to his Government for giving Colonel Rowley permission to read his paper here.

THE REVIVAL OF NORTHERN NORWAY

DIDERICH H. LUND

Director of the Finnmark Reconstruction Office, Harstad, Norway

THE DESTRUCTION CAUSED by the Second World War has been vast and widespread. Nowhere has it been more complete than in northern Norway, the northernmost inhabited region of Europe. Here an area of 23,000 square miles—more than one-third the area of England and Wales—lying 300 miles within the Arctic Circle has been subject to devastation which, except in the extreme eastern quarter, is complete. Every object placed there by man has been destroyed. To maintain life is hard where for two months in the year the sun does not rise and the snow lies until the end of May and into June. The nearest point is two days' journey from the rail-head and 1000 miles from the capital city of Oslo. Remote and unapproachable, northern Norway would have been impossible to resettle were it not for two conditions: one, the absolute determination of its forcibly evacuated people to return to the sites of their former homes; the other, the natural richness of the area and the part it plays in the economy of Norway.

The German attack on Norway on 9 April 1940 was made at many points, the most northerly at Narvik, the important exporting centre for iron-ore and the terminus of the railway from Sweden. Narvik was however recaptured from the Germans and the extreme north of the country was not occupied until after the capitulation on June 10, two months later. It became the most

heavily fortified part of the country, for its coasts commanded the sea route for Allied convoys taking supplies to north Russia and very large numbers of German troops were quartered there as well as thousands of prisoners of war. The South Varanger district, with a population of 7000, at one time had 70,000 troops.

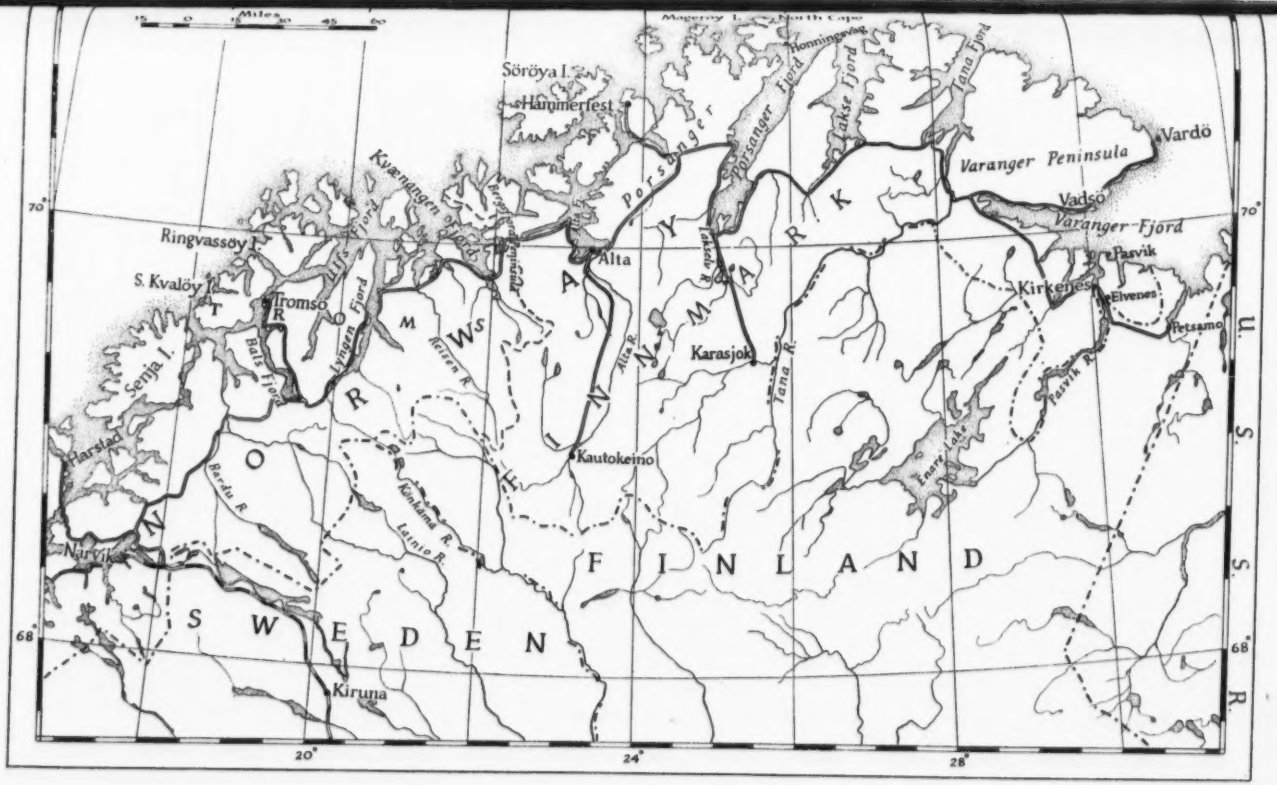
Last to be occupied, northern Norway was the first part to be freed. Russian troops in October 1944 made a lightning attack on the Germans and captured the most easterly district of Kirkenes. Though the Russians did not attempt to advance farther west under winter conditions the Germans fled, first in panic and then deliberately retreating westwards, carrying out a policy of systematic destruction which in its consequences can have no parallel. They were only arrested after more than six months by their own total capitulation. By that time the forcible evacuation of the 60,000 inhabitants had been completed and the planned destruction had reached Lyngenfjord in the county of Troms, where houses on the eastern side of the fjord were in flames.

The area of destruction therefore covers not only Norway's most northerly county, Finnmark, but also six districts of the adjacent county of Troms. As however the pre-war statistics available refer only to the county of Finnmark, the following description of the region before the destruction of 1944–45 will apply only to that county unless specifically stated otherwise. Let us begin by considering the nature of the country and the life of its people, in order to be able to understand the peculiar problems of reconstructing a whole community literally from the ground up.

Physical background

Northern Norway is characterized geographically by a series of peninsulas divided by fjords which, with one exception, pierce the land from north to south. The steep mountains rising out of the sea make the coastal scenery of northern Norway most impressive. Lyngenfjord in Troms is renowned for its beauty. Kvænangenfjord is the western boundary of Bergsfjordhalvöya (the Bergsfjord peninsula) through which runs the county boundary between Troms and Finnmark. On the peninsula, permanent snowfields lie over 3000 feet above sea-level. Before the war Altafjord was famous for its birch and pine forests which clothed the sheltered head of the fjord. Eastward Porsangerfjord, Laksefjord, and Tanafjord are bounded by mountains diminishing in height and finally Varangerfjord, which runs east and west, cuts off the Varanger peninsula, the most low-lying part of this coast which lacks the archipelago fringing the mainland to the west.

From south to north the district may be divided into three parts, in each of which the people have a characteristic mode of life. The outer, ocean-bound coast of mountainous islands and indented shore-line is bare of trees though luxuriant grass and flowers grow in sheltered spots. In places the cliffs teem with bird life and the sea is rich in fish, the most important natural resource of the whole region. The chief fishing centres are in the east of the county and the three towns Hammerfest, Vardö, and Vadsö lie within this outer coastal region. The scenery of the fjords is gentler. Birch forests stretch northwards from the heads of the fjords towards the open sea. Here and there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Lakse Fjord
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Vardö
Varanger Peninsula
Vadsö
Varanger Fjord
Pasvik
Kirkenes
Elvenes
Petsamo
Kvænangen Fjord
Alta Fjord
Alta
Ringvassöy I.
S. Kvalöy I.
Tromso
Lyngen Fjord
Balsfjord
Senja I.
Harstad
Narvik
Kautokeino
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along the shore is land rich and flat enough for cultivation and mountain and arctic flora clothe the slopes of the mountains during the short summer. Inland lies the Finnmark Vidda, a relatively flat plateau with forests, lakes and marshes lying in shallow, open valleys. The inhabitants of this region are the Lapps, their life controlled by the movement of their reindeer herds. Settlements tend to follow the rivers, which are rich in fish and provide the most direct means of transport.

On the Vidda are great stretches of birch forest, the characteristic tree of Finnmark. Wherever there is shelter the birch survives until towards the coast the gnarled trunks give way to little more than bush-like growth. This wood is excellent for fuel but not for building. Pines grow in certain well-protected areas at moderate altitudes. The pine forests, which were the pride of Altafjord and especially of Alta itself, have been irreparably damaged by ruthless felling during the years of German occupation and also by the smoke screen put up to protect the *Tirpitz* lying in the fjord during air attacks by the Allies. Trees grow very slowly in this climate and the damaged forests cannot be replaced in a man's lifetime. Pines also occur in the Lakselv river valley, but the largest area is in the Pasvik valley in the east near the Russian frontier. Spruce, the commonest tree for building material, is unknown in Finnmark.

There is an abundance of wild berries in the late summer, cloudberries, blueberries, and cranberries. Among crops, the potato alone is in general cultivation. Cereals do not ripen easily but grass may be waist high in July and provides animal fodder for the winter.

The effect of the North Atlantic Drift is to keep the temperatures near the Finnmark coast remarkably even. The winter temperatures are hardly lower than those to be found 1000 miles inland to the south. This contrasts with the Vidda where, at Karasjok, temperatures of $-58°$ F. have been recorded. The cold and heavy air over the Vidda streams northwards through every break in the mountains and in meeting the warmer air causes the terrific winter storms of the Finnmark coast.

Not only the climate but also the complete transformation from endless day to endless night is responsible for the unusual mode of life of the people. Though the sun never sets for over two months from May to July (82 days at North Cape) spring comes late. Snow lies and may fall until the beginning of June. Under the influence of prolonged daylight green shoots force their way upwards and hay may be gathered where snow lay two months earlier. The period during which the sun never rises is rather shorter and the darkness is mitigated by the Northern Lights which fill the winter sky.

Economic background

The area of the county of Finnmark is 20,000 square miles or rather more than that of Denmark (17,000 square miles). The population at the time of the last census in 1930 was just over 53,000, but in 1944 was estimated at about 60,000; even that was a density of only 3 per square mile. The destroyed districts of north Troms had at that time a population of about 15,000. Seventy-five thousand people therefore were involved in the disaster of the winter of 1944–45.

As may be expected, most of the people live by the sea; only 10 per cent. live

more than 6 miles inland, and most of these in small communities. The three towns of Hammerfest, Vardö, and Vadsö hold about 10,000 people, and 54 smaller towns of more than 100 inhabitants hold another 19,000 (1930). The remainder of the population—about half—lives in isolated houses or small villages of less than 100 people. Transport, distribution, and school and health services are difficult in these circumstances.

Along the coast people have settled where there was good fishing, a harbour, or land suitable for cultivation. Before the days of motor-driven boats, proximity to the fishing grounds was of supreme importance. To-day, protection for the larger boats is more vital, though the main fishing communities, founded in the early days, are still along the exposed and barren outer coast. Farther inland, agriculture plays an increasingly important part as a subsidiary occupation to fishing.

To meet the educational needs of such a scattered population, boarding schools have been built so that every child might have the opportunity of regular school attendance.

The supreme importance of the fishing industry is shown by the 1941 figure of 9000 men with fishing as their chief occupation besides 2200 others who worked in connection with the industry. In 1938 Finnmark contributed 125,209 tons, or more than one-eighth, to the total Norwegian catch of 1,064,680 tons of fish, which was approximately the same as the total British catch for the same year (1,100,000 tons). Before the war 95 per cent. of Finnmark's catch was salted or dried for export. There were then 227 plants for the production of cod-liver oil and 225 for salting fish. In addition there were 2 herring oil factories, 5 freezing plants, 4 fish manure plants, and 5 canning factories. Vardö alone normally handled 40,000 tons of fish annually and harboured 600 fishing smacks.

In 1941 Finnmark's fishing fleet was composed of 14,000 fishing smacks with deck covering of which 800 had motors, and 2,800 open boats without motors. Hundreds of these fishing boats and nearly all rowing boats were destroyed by the Germans in 1944–45 and it is not difficult to estimate the significance of this to the economy of the district.

Agriculture on a small scale was of great importance to domestic life, since the few animals kept were sufficient to provide milk, meat, and wool for individual families who could thus dispense with large cash incomes and yet be provided with the main necessities of life. As previously mentioned, the chief crops are potatoes and hay. In 1939, of 6083 farms and small holdings, only 3936 were over $1\frac{1}{4}$ acres. Cows were distributed as follows: 61 farms had 6 or more cows, 847 had 3–5 cows, 1600 had 2 cows, and 2000 had 1 cow.

The total of domestic animals in Finnmark was made up of 1162 horses (an average of 1 to each of the 9000 largest farms), 9407 dairy cows, 40,293 sheep, 7305 goats, and 430 pigs. Reindeer in 1931 numbered 95,000, distributed among 252 owners.

With very few exceptions all domestic animals were slaughtered by the Germans and only half of the reindeer were driven to safety. Until a large proportion of these animals can be replaced, normal food conditions for the people are impossible. An interesting feature of the evacuation is the number

of pigs which are being brought by families returning to Finnmark: th number must already exceed the pre-war figure.

The mining of iron ore in Kirkenes is the largest single industrial concer in Finnmark, employing over 1600. Of great importance to this industry an and to the life of the whole county has been the hydro-electrical developmen of Finnmark's rich resources of water power. Hammerfest was the first tow in Norway to have electric power, as early as 1892. The original plant is no being used as a temporary measure until the much larger modern plant can b rebuilt.

The quarrying of roofing slates is a seasonal industry employing 1000 men In addition to the plants mentioned which handled fish and its direct by-pro ducts, there were dairies in Hammerfest and Kirkenes, a margarine factor in Hammerfest (producing 600 tons per annum), and 6 mineral-wate factories. At Alta and in the Pasvik valley there were sawmills producing timber, planks, and wood for fish-crates.

The opening of the Syd-Varanger Iron Mines at Kirkenes in 1906 meant the development of a small village into the town of 4000 inhabitants of the present day. Elsewhere the increase of population has also been very marked, amounting in the rural districts to 40 per cent. between 1920 and 1939. This can be accounted for by the migration of Norwegians northwards under the incentive of economic advantages due to the increased speed of transport, the use of motor-driven boats for fishing, the introduction of electric power, and the resultant developments in the preparation and export of fish and fish products.

Historical background

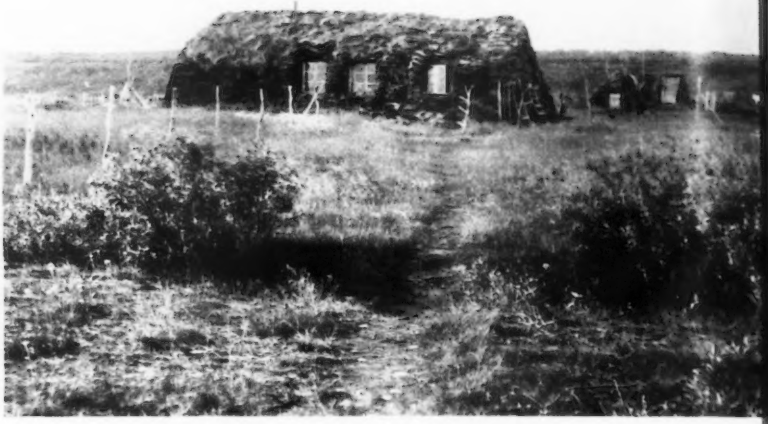
Though Finnmark has been inhabited from very early times, there is no indication that people of Norwegian stock settled there before the latter part of the thirteenth century, though they made casual visits for purposes of trade. Long before this however Finnmark had been part of the taxable area of the Kingdom of Norway. The original inhabitants, the Lapps or Samer,[1] had in the ninth century tamed reindeer for transport and were independent of traders since they obtained both food and clothing from their herds. It was these people who were made to pay taxes. As early as this, Norway's tax collectors came in touch with people of Finnish origin (Kvener) who came up river from Bottenviken and also demanded taxes from the Samer. People from the neighbouring countries of Russia, Finland, and Sweden pushed west and north towards the Norwegian coast and it was not until 1751 that the frontier of Norway was finally fixed.

In the thirteenth century there was already a well-established trade in dried fish with south Norway and in 1294, to prevent competition, foreigners were forbidden to sail north of Bergen. In 1361 Bergen gained the monopoly of the trade with Finnmark. From that date, citizens of Bergen travelled north taking with them their families and servants and settling in Finnmark itself. In 1456 Trondheim gained the same privilege and contributed a second wave of settlers. The fact that more than 20 churches were built proves that the

[1] In Norway the name Same (pl. Samer) for this people is now generally preferred to the name Lapp.

Hammerfest before the occupation

Hammerfest after destruction by the Germans



"Gamme" hut covered with turf, the poorest type of dwelling in Finnmark bef the war

A family of Samer outside their summer tent

population of Finnmark was considerable and permanent. Traders in Bergen were envious of their more adventurous brethren and succeeded in 1572 in nullifying the advantages of residence in Finnmark itself by an order compelling all trade to be centred in Bergen including the marketing of fish. There followed a swift deterioration in the condition of Finnmark and its people. A hundred years later Finnmark was being colonized by convicts sent north by the authorities. So bad became the economic situation that in 1720 a law was passed forbidding any one over 18 years of age to leave the county and later, to prevent complete depopulation, even infants came under the ban. Of the 20 churches, 12 were pulled down before the end of the eighteenth century.

In 1789 the trade in fish was made free and the effect upon northern Norway was immediate. The development of the towns of Tromsö, Hammerfest, and Vardö was decided by law the same year and the damage of two centuries began to be repaired. The modern development of Finnmark dates from that time.

Meanwhile the Samer continued their nomadic existence, following their herds over the Vidda during the winter and down to the coast in summer. They have tended to give up their nomadic life and settle by the shores of the fjords and rivers, depending for their existence upon fishing and agriculture. Some have intermarried with people of Norwegian and Finnish origin and partially or wholly given up their native dress and language. Of the 60,000 inhabitants of Finnmark, about 10,000 are classed as Samer but of these only 1200 to 1300 are nomadic. These however form about two-thirds of the nomadic Samer of Europe.[1]

The third distinct group of people in northern Norway are the Kvener, of whom the 1930 census numbered 5538 in Finnmark. These people have migrated from Finland and are of different racial origin from both the Norwegians and Samer though all claim Norwegian citizenship. The first Kvener settled in Alta in 1714 to work the rich river salmon fishing, and later others came to Karasjok on the Finnmark Vidda. The Kvener of Karasjok lived in timber houses and used oxen teams for timber hauling. They married the daughters of the mountain Samer and took up their language and dress. Many of their descendants are among the non-nomadic population of the districts of Karasjok and Kautokeino.

The inland-dwelling Kvener were the first to introduce corn as a crop in sheltered Altafjord. To their knowledge of agriculture they soon added that of sea-fishing and were encouraged by the Norwegian authorities. Hard times in 1865–68 in northern Sweden and Finland brought a fresh stream of immigrants. They tend to live in colonies, as do the non-nomadic Samer, retaining their Finnish language though at school they have to learn Norwegian.

Thus, up to 1940, northern Norway was developing and becoming of increasing importance to the country as a whole. Telephone and telegraph

[1] These figures relate to the Samer who are strictly nomadic, the whole family moving with the reindeer herds. There are however many degrees of nomadism among the Samer and there are probably about 8000 in Europe who are more or less dependent on the reindeer economy, most of them in northern Sweden.

communications were being extended nearly everywhere. The natural means of communication is by sea and coastal steamers ran a regular daily service from Bergen to Kirkenes. The fjords were served by local steamers and the most isolated places made contact by rowing boat and fishing smack. The major points of call along the outer coast were therefore in regular contact with the south though all sea traffic was vitally dependent on the marking of the dangerous coast by an adequate number of navigation lights. The railway from Oslo has been creeping northwards but even to-day does not reach Narvik which is the rail-head for the line through Sweden. The mountainous and indented character of the mainland has made all land communication difficult but a State road linking Kirkenes with Tromsö was completed during the war so that a road now exists from Kirkenes to Oslo and to the Swedish frontier. This road is 2700 km. (1700 miles) in length and one-quarter of it lies within the county of Finnmark. For the greater part the road follows the coast through Finnmark, climbing the mountains only between fjords. From the head of Alta and Porsanger fjords roads branch south to Kautokeino and Karasjok respectively and from Kirkenes the road links up with the "Ishavsvei" (Arctic Road) into Finland and Russia. Many bridges span the rivers and streams but it is impossible to keep the most exposed portions of the road open during the whole winter. The coming of buses and motor transport will revolutionize inland communications in summer. In winter some of the fjords are frozen and sledge tracks lead over marshes and lakes. The German development of aerodromes, and particularly the use of seaplanes, has added a new and important chapter to the development of communications in northern Norway.

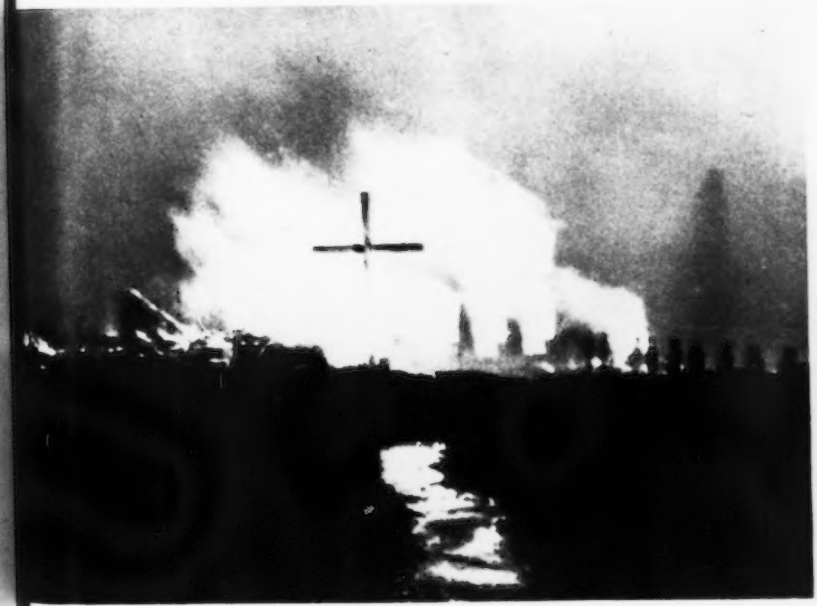
Disaster

With this picture of the northernmost part of Norway in mind we can follow the stages of the catastrophe which swiftly moved to its climax in the last months of the war.

Up to October 1944 northern Norway had felt most severely the pressure of the military occupation. Food supply was less difficult than in urban areas especially as fish was always available. The district lay beyond the easy reach of the Gestapo, but even so there were those who experienced the concentration camp and some who did not return. Eight hundred arrested Norwegian teachers were sent as prisoners to forced labour in Kirkenes by the Quisling Government and the Germans, and their bravery made a deep impression on the local population. But it was the intensity of the military occupation which characterized the people's wartime experience. Military barracks, camps, aerodromes, and fortifications sprang up everywhere. Mines on sea and land were an ever-present danger. In consequence of their military importance Kirkenes, Vardö, and Vadsö suffered constant bombing. In Kirkenes 45 buildings out of a total of 500 were damaged and in Vardö and Vadsö two-thirds of the built-up area was destroyed. The remainder of Finnmark was little damaged until October 1944 except by the extensive building of fortifications and requisitioning of schools and other buildings.

The unexpectedness and speed of the Russian attack in October 1944 took the Germans by surprise and in their hasty retreat they had only time

fishing fleet, destroyed by the Germans during the war, laid up in Vardö harbour



The burning of the Catholic church at Hammerfest

Living conditions typical of Finnmark in the winter of 1945–46

Improvised house built during the resettlement

destroy certain tactical features such as bridges. The population of South Varanger—about 15,000 people—was not evacuated. In Kirkenes some 4000 hid in the tunnels of the iron mines during the period of fighting. Norwegian military forces from England and Sweden joined the Russians immediately after the Liberation and the Norwegians took over the administration of the district. Because they brought freedom and through their good behaviour, the Russian troops left a very favourable impression on the people of Finnmark.

The Russians did not advance beyond the extreme eastern district and meanwhile the Germans carried out their planned retreat. Beginning on the north coast in the neighbourhood of Tanafjord, the people were ordered to evacuate at some hours', or in many cases a few minutes', notice. Some had to leave their homes in the midst of their daily work. Evacuation ships fetched those who could not leave in their own boats and under terribly crowded conditions they were taken south. This evacuation continued during the whole winter under the most severe conditions. Fortunately the winter of 1944–45 was milder than usual or many would not have survived. German troops followed, systematically burning every building down to the smallest shed. The animals were slaughtered or burnt in their stables. After the wooden structures had been burnt their concrete foundations were dynamited. Quays were blown up and burnt. Telegraph and telephone poles were shattered at the level of the snow by hand grenades and the wires cut. All bridges were blown up, power stations and power- and pipe-lines destroyed. Boats were either burnt or chopped to pieces. Fences were chopped down and left lying mile after mile as a fringe along the road-sides. Many miles of snow-screens protecting the mountain stretches of roads were sawn down and burnt at regular intervals. Russian prisoners were employed on this and the graves of many of them are to be found where they worked.

The destruction included all German military constructions, camps, fortifications, motor vehicles, and so forth. This has left a vast amount of indestructible and rusty metal, especially barbed-wire, which will take years to be removed.

The only buildings which were spared were a few churches, and these small, white wooden buildings assumed gigantic proportions as they stood alone among the mountains. The towns shared the general fate. In Hammerfest only the lines of the streets marked where the town had stood and one building alone remained—the little chapel of the graveyard on the outskirts of the town. Papers and files belonging to the Municipalities were destroyed so that boundaries of property are often difficult to establish and re-mapping of whole districts is sometimes necessary.

The following are some figures of the destruction: houses for 60,000 people of which 6000 were farms, all domestic animals, 20 churches, 15 vicarages, 150 schools, 21 hospitals and dispensaries with a total of 578 beds, 22,000 telegraph posts, 350 bridges, 180 navigation lights, 350 motor-driven boats.

Evacuation was everywhere compulsory and some thousands attempted to escape by fleeing into the mountains and building themselves turf huts in which they managed to spend the winter. Fortunately in some places no snow was lying in October and November so that they could not be traced. After

the destruction some of the men returned to the coast to fish or to see what remained of their homes. Some had sunk their boats to hide them and now took them up for use. The Germans sent patrols back to complete the evacuation and occasionally they found these people. On the east side of Porsangerfjord about 900 people managed to survive the winter, living on their cattle and stores they had taken with them. Some of this was bread left by the Germans after they had made it uneatable by pouring creosote upon it; in spite of this it formed the diet of some of these people for the last two months. On the island of Söröya several hundred people hid and after the Norwegian Forces from Great Britain had made contact with them they were assembled and taken over to Glasgow in a British destroyer from under the very noses of the Germans.

By 7 May 1945 the whole area between South Varanger and Lyngenfjord had been entirely destroyed and depopulated. Of 75,000 people, 50,000 had been transported, the majority south of Tromsö and very many as far as Oslo and beyond. Some had succeeded in crossing the mountains to Sweden and Finland, among them some of the mountain Samer with 50,000 reindeer—that is, half the total reindeer flocks, the remainder of which were destroyed.

Return

It might have been expected that the problem of restarting existence in so remote a region under severe climatic conditions would deter any people stripped of all possessions as these people have been. This has not proved to be the case, and nothing has been so decisive in the reconstruction of Finnmark and northern Troms as the determination of the people to return and begin life again on the sites of their former homes.

In June and July 1945, as soon as the snow had melted, individual men and even women began to return and the late summer brought a steady stream despite the efforts of the authorities to prevent them. The few churches were immediately used to live in; elsewhere tents had to be used. They dug in the ashes of their homes and salvaged broken crockery and rusty cooking pots. They put up fences and gathered in the hay, but the possibility of remaining for the winter depended on the arrival of building materials and the barest necessities of life.

Planning and reconstruction

Meanwhile the Norwegian Government's plans, already prepared in London during the war and in eastern Finnmark, were put into action. Immediately after the Liberation all reconstruction was placed by the Government under the direction of a separate Ministerial Department with a consultative Minister responsible for Finnmark. The chief office from which the work was directed, the Finnmarkskontor, was established at Harstad in northern Norway but south of the destroyed area because of the difficulties of finding accommodation for the staff and storage space.

The greatest hindrance to reconstruction was the minefields which were only partially mapped. It was estimated that about 800,000 land mines would have to be removed. Roads and meadows, shores and mountains were strewn with these deadly weapons besides unexploded ammunition dumps. German prisoners of war worked on their removal but they continued for

months to be a danger which to-day is not entirely past. At sea the mines delayed shipping and without lighthouses and navigation lights shipping was at a standstill except during the hours of daylight. The harbour at Hammerfest was not open until 8 September 1945. For months the coastal steamer from the south could go no farther than Tromsö, and all communication and transport farther north and east had to be by fishing smack. One of the earliest priorities was given to rebuilding quays in order that building materials and supplies could be landed.

The first phase of reconstruction met the urgent need for housing by demolishing German military barracks in the south and sending them north. No other building material was available immediately after the war and these barracks, made in sections, were quickly re-erected as temporary dwellings. They began to reach Finnmark in August 1945 and 1600 were erected before the end of the year. With the accommodation the people had built for themselves they housed 16,000 of those who had returned by the end of 1945. Before the end of the summer of 1946 nearly 40,000 men, women, and children of the 50,000 who were evacuated had returned. The State bore the whole cost of this first stage in reconstruction and the people pay only a nominal rent for the use of these temporary buildings. The destroyed districts have become settlements of barracks where community life and rebuilding are in full swing. The erection of barracks for domestic purposes came to an end with 1946.

While the Finnmark office handles the technical and economic side of the whole problem on behalf of the State, the people themselves have been encouraged to solve local social and cultural problems. In each area the District Council has appointed a Building Committee which advises on local problems and settles the nature and priority of rebuilding in the area, taking into consideration the quota of material allocated by the Finnmark office. The local committees send representatives to the County Building Committee which works in close touch with the Finnmark office and which will, before the end of 1947, take over responsibility from the State.

A necessary preliminary to rebuilding is the planning of the towns and built-up areas. The whole region also needs surveying as a unit. Before the war people lived in many places which are now not suitable or well placed in relation to present economic conditions and transport facilities. It is possible that some will not be rebuilt and new sites will be chosen with an eye to water and electricity supply, educational services, and other considerations.

Housing.—Housing conditions in Finnmark before 1944 were not on the whole good but were improving. The natural building material, as in all Norway, was wood, of which not only houses but also schools, churches, warehouses, and quays were constructed. In the poorer districts there were still to be found *gammer*, low huts of planks with a thick layer of turf round the walls and on the roof. In the country districts half the houses were one storey and none more than two. Some houses recently built with the help of loans from the Smallholders and Housing Bank were better and in less isolated parts were equipped with electric light and power and other modern conveniences. Only in the towns were some buildings built of brick or concrete, most of them business premises.

The most important units in rebuilding will be detached wooden houses for single families with an average floor space of 600–700 square feet to a maximum of 1000 square feet. In the towns most of the buildings in future will not be of wood. At the other end of the scale *gammer* will not be accepted as permanent dwellings, the whole policy being to raise and level the standard of housing. A competition open to architects has produced a number of plans which are being used as model types.

By the end of 1946 8000 temporary buildings had been set up, mostly former German military barracks, which gave accommodation to the majority of the 40,000 people who had returned to Finnmark and also to about 1000 who had escaped evacuation and stayed behind in the mountains. The total programme is for 12,000 permanent houses to be built over a period of 4 years. An intermediate stage in rehousing is represented by the *baarstuer*, a small prefabricated building with 300 square feet floor space divided into a kitchen-living room and one or two small bedrooms. Where necessary these will be enlarged later or a new house will be constructed and the *baarstuer* used as a farm building or stable. By the summer of 1947 about 1300 permanent houses and 1200 *baarstuer* had been constructed, besides 400 stables and cow-sheds which, since they are essential to the life of the community, are being built on a very high standard.

Since the people have suffered a total loss the State has agreed upon a scheme of war insurance through which compensation is paid on a scale fixed by the Storting. The scale is based on the 1940 estimated valuation of property plus 50 per cent. (The rise in price of building over the pre-war cost is actually nearer 100 per cent.) The funds needed to cover the scheme are being raised by a war compensation tax on all property values throughout the country.

It has been the general wish in Norway that the disaster which the northern districts have suffered should be used as an opportunity to raise the standard of housing to modern standards of social welfare. To ensure this the Storting have decided to create Den Norske Stats Husbank (The Norwegian State Housing Bank) which will make loans at $2\frac{1}{2}$ per cent. up to 85 per cent. of the building cost to those who have been given priority to build by the locally elected committees which will regulate the scheme. In order to keep the rents within the means of the working man, the Bank is permitted to grant loans on which no interest is payable except in special cases. These loans amount to 14–18*s* .per square foot of floor space: that is, $\frac{1}{3}$ to $\frac{1}{2}$ the actual cost of building.

In this way even the poorest man in Finnmark should be able to rebuild his home and provide his family with reasonable living conditions. Owing to the extent of destruction elsewhere in Norway under the German occupation the State cannot rebuild Finnmark in less than four years. Even for this to be possible Finnmark must have priority over all other damaged towns and villages (for example, Televaag, Narvik, Bodö, Kristansund, Steinkjer, Namsos) where the total cost of reconstruction amounts to many times more than that of Finnmark.

Fisheries.—Industry and agriculture in northern Norway will be re-established on much the same lines as before the destruction though the moment

may be opportune for modernization locally. The fishing industry however and plants handling fish products for export will be rebuilt upon new lines to a considerable extent. This work is under the direction of a new Ministry of Fisheries. It has been made necessary by the revolution which the whole industry has undergone in recent years. Mention has been made of the change from rowing and sailing boats to larger motor-driven vessels and the importance of this in reaching distant fishing grounds. To this should be added the modern methods of handling and transporting fish at temperatures far below freezing-point which necessitate the assembly of the whole fishing catch at a few points. Centralization also makes easier the processing of by-products such as cod-liver oil, fishmeal, and fertilizers.

Until now trawling has not been generally permitted in Norwegian waters and there is still much opposition to it, but this is not likely to be so much longer. This will have its effect on the fishing population of Finnmark and must be taken into consideration in planning for the future. Honningsvåg, Baatsfjord, and Vardö are likely to become centres of increasing importance.

In this connection it may be mentioned that the Cooperative Movement made considerable progress in the years before and during the war. This affects both those who work in the industry and the methods of handling and selling the products. The economy of the communities which will arise in Finnmark now will be different from that which the Germans temporarily wiped out in 1944.

Among the leaders in the reconstruction of northern Norway mention should be made of the Consultative Minister for Finnmark, Peder Holt, himself a Finnmark man and former editor of the Labour Party's newspaper in Vardö; and Hans Gabrielsen, the chief Administrative Officer of the county, whose name has since 1928 been associated with the steady development of Finnmark. During the German occupation both these men spent years in concentration camps. Both command the greatest confidence and their names unite all who are working for Finnmark's future.

The map of northern Norway on p. 187 was drawn before the treaty with Finland was published on July 30th, whereby the three areas ceded to Soviet Russia after the Russo–Finnish war of 1940 were confirmed as Russian territory. In the north, the Russo–Finnish frontier now runs from the southern extremity of the Norwegian frontier on the Pasvik river to the bend in the old Russo–Finnish frontier at Korvatunturi, allowing the District of Petsamo to Soviet Russia.—Ed. G.J.

GEOGRAPHICAL SCIENCE IN EDUCATION

S. W. WOOLDRIDGE

Joint Meeting of the Society and the Geographical Association, 3 January 1947

THE GEOGRAPHICAL ASSOCIATION enjoys to-day the hospitality of the Royal Geographical Society and so returns, in a real sense, to the family home. I need not recall in detail the relations of the two societies for the story has been told elsewhere. The great pioneer work done by the Royal Geographical Society in seeking to extend and improve the teaching of Geography led directly to the founding of the Geographical Association. Since then the explicitly professional and educational aspects of the subject have fallen largely to the charge of the younger body, which remains at one with its great parent society on the prime need for advancing geographical education. This subject is therefore very fitting to our joint consideration this evening.

It has taken more than half a century of effort to secure a reasonable measure of recognition for Geography in this country and the battle is not yet wholly won. When in years to come the struggle is surveyed in retrospect, certain curious and significant features will become clear. The living idea for which Geography stands will be seen to have emerged as a sign of the times. The first world war had come and gone before there was any major advance in the Universities. The next two decades brought probationary recognition for the subject at one University after another in steady succession, followed in some cases by full recognition and by the creation of a chair in the subject. The period of the present war has seen further progress; to-day there is only one University in England and Wales without a chair of Geography, though the position in Scotland is notably less satisfactory. During the same period there has been continuous improvement and consolidation in the teaching of Geography in the schools. It is a pleasant duty to salute my colleagues, the sixth-form teachers, who have so successfully implanted enthusiasm for the subject in young, vigorous, and flexible minds. To them is chiefly due the fact that reluctant Courts, Senates, Vice-chancellors, and Deans have been forced to make provision for University Geography. It has been conceded in fact that if Geography is to be taught in the schools it must be learned in the Universities and the number of students coming forward has rendered Geography a subject of substantial size in the faculties of Arts, Science, and Economics.

These are well-known facts on which I need not dwell. They might appear to justify satisfaction if not complacency with the present position. Yet neither in the schools nor in the Universities can we feel wholly satisfied. We represent an idea or a group of ideas which is slowly forcing its way to recognition but which remains unpopular, or at least unappreciated, and therefore unprivileged. Ignorant or perverse individuals lurking in the backwaters of the educational stream still suffice to retard and obstruct locally. It is the

burden of my argument that time is on our side and that the mental climate of our time will assist the further recognition of Geography. But this is no argument for the folding of hands; we are in no sense exempted from taking council together so that our advance may be a deliberate and considered one.

The dissatisfaction which we feel arises not from the lack of ostensible recognition but from the widespread belief among out colleagues and associates that we lack real academic status and intellectual respectability. What has been conceded is that Geography has a limited use in the lower ranges. What is implicitly denied by so many is that it has any valid claim as a higher subject. Neither the Sciences, natural or social, nor the Arts receive us with unqualified cordiality. The senior geographers of this country who have made the subject what it is and to whom you and I owe so much have, generally speaking, been excluded both from the Royal Society and the British Academy. The former body admittedly concerns itself with certain aspects of research in Geography through the medium of the National Committee for Geography, and it rightly makes contact through this committee and in other ways with the Royal Geographical Society. We may be grateful for the useful work it has often done and yet find it anomalous that the University Schools of Geography are hardly represented upon it. It is right that the views of plant ecologists, soil scientists, meteorologists, and others should be sought and we would not be without their assistance. But the view represented by the constitution of the Committee is evidently the familiar one that the borderline fields of Geography are interesting and valuable but that the subject itself as a compendious whole is academically not "on the map."

It cannot be doubted that our case has been greatly weakened by those who have sought—and which one of us at some time has not—to represent Geography as a subject just like other subjects with special matter entirely its own. Our confident and in the end triumphant submission must be that, on the contrary, Geography is generically different from the analytical sciences and such of the Arts as pursue similar methods. This fact may not be entirely evident at the school stage, for there Geography has a direct informative content largely independent of that of other subjects. The historian and the physical scientist skirt the field and the mathematician may pause on occasion to indicate in what sense geometry justifies its root meaning. Yet it is idle to pretend that any adequate picture of the home area, the country and continent of which it is part, and the world which contains them all could spontaneously compound itself from the other subjects of the school curriculum. The crux of the question begins to emerge at the Higher School stage and to become clear and urgent in the first years at the University. The good Higher School candidate—he of the prehensile memory and the two or three supplementary answer books—is apt to think that he has "done" Geography as his Arts fellow has "done" Shakespeare. Then comes the "sea-change" in which the subject seems transformed into something new and strange. The old idols and simplicities are ruthlessly shattered and the subject seems to dislimn into a chaos of specialisms. Yet it is our case, and it is certainly our experience, that the picture finally comes whole again. The study of Geography, from first to last, involves integration; there are successive

levels of geographical integration and at each further stage more of the background moves into the picture.

The case against us primarily concerns our method. When we have made due admission of our own faults and imperfections, the faults of a young subject, unfavoured in staffing, equipment, and general regard, a subject far from fully coordinated as yet and lacking something of tradition and assurance, it remains clear that what is suspect is not our declared aims, but our mode of thought, and by that we must stand or fall. In rising to this challenge, I claim to speak of Geographical Science and I make the claim in deliberate protest against that narrower use of the term "science" which is not so much current as rampant. It is no doubt natural that many subjects should seek the prestige which the name of science is held to confer. Thus Political Economy became Economics and then Economic Science. "History," said Bury, "is a science, no less and no more." We need not here discuss the question at issue, while admitting that in the case of some subjects the claims made are wholly ludicrous. Thus D. C. Macintosh goes beyond the preposterous statement that Theology is the queen of the sciences by inventing a system of formulae for theological concepts which can be used in a species of equations to throw light on the nature of God.[1] The geographer can take up a more definite and less pretentious position. By no conceivable distortion of words or ideas can Geography be forced into the rôle of an analytical science. But science also includes Natural History in the sense defined by J. R. Baker,[2] as covering the investigation of objects and phenomena which can be studied as wholes, mainly by observation and, one might add, by statistical methods. Even the analytical purists have never dared to exclude the whole of this field from science. In so far therefore as the face of our planet and man in his geographical aspect are part of Nature, Geography falls within the field of science, whether we are studying the natural history of land forms or of those processes and phenomena which constitute Social Geography.

The rôle of geographical science in education can be considered from two points of view: on the one hand, its rôle in education regarded as an end in itself; on the other, the highly topical question of applied Geography—the question of what the trained geographer can do besides teaching what he has learned.

On the first question much has been said and written and you will expect me to do more than echo the truism that Geography is a linking subject, a subject central to the curriculum and a bridge between science and the humanities. There is indeed a much more fundamental view of the matter and one which better enables us to carry the war into the enemy's camp. What are really at stake are the virtues and validities of analysis and synthesis respectively. The method of the natural sciences is analytical. The broad or crude facts of physics, chemistry, and biology are given to simple observation. Complex inter-relationships and chains of cause and effect are revealed only by detailed analysis, coupled with abstraction and the exclusion of all elements deemed irrelevant. This method has proved so powerful and flexible that it

[1] D. C. Macintosh, 'The problem of religious knowledge,' pp. 202–4. New York, 1941.

[2] J. R. Baker, 'The scientific life,' p. 92. London, 1942.

has come to affect the whole of our thinking and academically takes precedence of any other. It has dominated man's thinking now for three hundred years. Yet its results in school, University, and the world at large give ground for much dissatisfaction. It is this system of thought which is the real basis of the specialization so often deplored, by which the student sacrifices wider horizons to travel a narrowing path designed to render him first, say, a botanist, but in the end perhaps primarily a mycologist. It is this same system which overcrowds our curricula with autonomous subjects jealously competing for shrinking time-table space. More fatally still it is the analytical method, applied pure and unrelieved, which renders our education directionless and devoid of any adequate philosophy. So grave has the position become that men of all types and outlooks have diagnosed our plight as a veritable intellectual crisis. One must agree with Arnold Nash[1] that both the Fascist and the Marxist philosophies lead to educational systems which are partial answers to the problem. They seek to give unity to education by directing it to the ends of the State or the communist ideal respectively. Neither system is without a philosophy, even if it be one which is unacceptable to most of us. Nash himself, speaking with, if not for, the Christian minority in this country, would wish to see the Christian view of the nature of man and his world re-established as the philosophical background of education. Conscious though I am that much more vigorous and radical thinking will be needed if such a point of view is to have a chance of commending itself, I range myself with this party.

On these large aspects of the general question, the geographer as such has necessarily no more if no less to say than any other specialist. Let us not foolishly claim for our subject that it is the happy solution to all educational difficulties. We may claim however that within its proper field the geographical method is an antidote to the vice of an exclusively analytical thinking. Its insistence upon regarding some aspects of Earth and man as related wholes affords training in that integrative thinking which is so much more difficult and generally less attractive than analysis. We discovered in youth when we rashly and privily dismantled the family clock that it is easier to take things to pieces than to put them together again. Man has taken his physical and social world to pieces with exemplary zeal, but confronted with the task of reassembling them seems inclined to the view that it cannot be done or is not worth doing. It is such a reassembling of *parts* of the analysed elements which Geography attempts. It does not of course alone pre-empt the synthetic method; history and the special social sciences share it too. But over an important part of the field the geographical method takes the analytical strands and gathers them to make a fabric. I cannot see that the case against this method could rest on any but two grounds, that it is impossibly difficult and (or) undesirable. We need not deny that synthesis is difficult but the case against it must surely fall to the ground when confronted with some of the major works of geographers, few in number though they be. Mackinder's 'Britain and British Seas' stands as witness to how much more a geographer can do than geologists, historians, or others working separately or in committee. Not less do some of the volumes of the *Géographie Universelle* attest the quality of

[1] Arnold Nash, 'The University and the Moslem world.' London, 1945.

the best of geographical synthesis; notably de Martonne's volumes on Central Europe and those on France by the same author and Demangeon published during the war. It might perhaps be pleaded that these are rare and refreshing fruits from the minds of occasional mature geographers and that the method is inadmissible because unattainable by lesser men. Yet we know how greatly the list could be extended and we perceive that the manner of thinking, if not full success in its application, is common to us all.

If then the geographical synthesis be not impossible, in what sense can it be undesirable? Here we reach delicate and dangerous ground. We are assured by one group of thinkers that there is a true sociology of knowledge itself, that subjects arise not spontaneously or from the whim of genius but in response to human needs and social pressures. The exceptionally clean-cut separation of Sciences and Humanities in this country certainly reflects in part the mental climate of the Restoration era when the Sciences could and did divorce themselves from politics, while the Humanities could not. I dislike some of the corollaries of this line of thinking, but it is impossible to gainsay the important measure of truth it contains. I certainly believe that the rise of Geography is a response to a need, the paramount need of seeing our world and its parts as a whole. Whether the results of such scrutiny will be deemed desirable or not will evidently depend on the point of view of those to whom they are offered. I sometimes wonder whether geographical syntheses are not hindered or discouraged, not because they are ineffective but because they reveal too much and too clearly. It may or may not be wise or possible for the analytical sciences to maintain neutrality in the world of values; the geographer cannot so remain neutral. We do not claim of course that our craft leads to any ready or inevitable solution of disputable social and economic problems; it may not of itself answer questions, but it at least asks them clearly. It certainly appears to me to throw a strong light on the position of Geography in this country that we are so calamitously and shamefully ignorant of our Colonial Empire. Geographers have been given no adequate encouragement or opportunity to study these territories. Whether the hindrances have been deliberate or inadvertent, they have been disastrous and indefensible.

This topic brings us by an easy transition to the second aspect of geographical science in education—the case of applied Geography. It is becoming very clear that there is urgent work awaiting us, both as practising geographers and as teachers. This country, in common with a large part of the world, is moving in the direction of a conscious control of its environment. Though opinions in the political sphere may legitimately differ as to the desirable mode and rate of such control, no informed mind can reject the conclusion that the state of the world or the stage of man's development calls for some measure of deliberate calculation and adjustment. The reasons for this are themselves geographical. Since Humboldt and Ritter founded modern Geography more than a century ago, the population of the world has doubled itself and the whole vast range of the Earth's productive resources has been brought into use by long-continued trial and error. There is now little new land to be occupied; the rapid westward migration of the American frontier and the more recent bold initiatives of Russian policy in settlement mark the

last stages of "filling up." Though the population of the world shows marked inequalities of distribution, there is reason to believe that it presents us in outline with a relatively static picture in the sense that people are, economically speaking, where they belong. We know to a first approximation the world distribution of metals, fuels and other sources of power. We have experimented widely with available crops and have bred new ones. In a word, the surface of the Earth has been developed by the mobile and ubiquitous human re-agent; its patterns have been brought out as the patterns of the photographic plate are revealed by the developing solution. As a result, spheres of occupancy, economy, and polity jostle or overlap one another and in the developed pattern the political geographer sees pressure points and the economic geographer distressed areas. It is certain at least that there is no room for the care-free drift of *laissez-faire*. It is not the whim of tyrants or the passions of parties which have brought present looming issues to their crux, but rather tides of the spirit and surges of social process, while lying behind them both are the physical facts of man's expansion to the limits of his habitat. If this verdict seems to ignore the intimations of an approaching atomic age, it can hardly be doubted that any such new major factor will complicate rather than simplify earth patterns and human problems.

It is against a background no less widely viewed than this that the geographer must find and follow his rôle. It concerns three distinct levels of action. In the first place, it has plainly become necessary to maintain the supply of trained specialist geographers. It was formerly a grave weakness of our subject that it led to no career but teaching. We are most of us teachers here and not ashamed of our calling, but we are able to acknowledge the small element of truth in the cynical dictum "those who can do, those who can't teach." Perhaps no subject requires further vindication that that it contributes to general enlightenment, but it is a healthy and stimulating feature if its crafts and skills are directly applied in the field of practical problems. Such a position has been fully attained by geographers of late. There are many aspects of a planned economy which lie beyond their interest and competence, but at least, in a small country like our own, land use is basic to the whole planning structure. There *par excellence* the geographer comes into his own. I shall not attempt here to assess the value of the geographers' direct contribution to the war effort and the not less urgent peace effort. It is sufficient to remark that at the moment the demand for geographers exceeds the supply and university staffs have been seriously depleted by the needs of government service.

Even more important than the training of specialist geographers is the diffusion of the distinctive geographical method among administrators. My own experience in this field is limited and various friends and colleagues know it much better. But I have recently seen enough to realize how vital to our times is a knowledge of modern Geography among the able and disinterested men who occupy senior posts in our Civil Service. They are willing to accept geographers as specialist colleagues but show no awareness either of the vast available body of geographical data or of how it can be used. To some extent the obstacle is the inimitable intellectual snobbery of a certain type of "Arts" man. A. L. Rowse has recently averred that[1] "one may be a cultivated man

[1] A. L. Rowse, 'The use of history,' p. 191. London, 1946.

without knowing mathematics, chemistry or engineering for those are specialisms. We expect the technicians in question to know them and to do our sums and sanitation for us." By contrast, to him a sense of history is part of the "self-awareness of our environment." To this we may agree, with the important qualification that part of the environment is geographical and any awareness which ignores this is to a large extent unawareness. Many of the products of our dominantly literary culture are woefully ignorant of the simple physical facts of environment, how soils form, how plants grow, and where underground water comes from. What is required to repair these grave defects in mental equipment is not that largely imaginary subject "general science" but geographical science in the widest and most enlightened sense of the term. For it is such simple facts, processes, and phenomena as related to area—to administrative boundaries and competing interests and uses—which enter continually into practical governmental problems. "Geo-politics" is a word so debased by usage as to be repellent and perhaps misleading. Yet great fields in both the internal and external spheres of government are concerned with a species of applied geo-politics. Until this fact is recognized and acted upon the difficult and delicate work of planning will be gravely hindered. There are not enough geographical specialists to carry unaided the burden of the necessary coordinated thinking and much of their effort is spent upon educating their administrative colleagues, many of whom reveal gulfs of ignorance for which an Intermediate Student would be ploughed without hope of reprieve.

If awareness of environment on the part of the governors is a prerequisite of any sound government in the world of to-day, how necessary it is also for the governed, at least in a democracy. This I believe is the aspect of the matter which concerns the greatest number of teachers. I ventured, in speaking at our Conference last year, to commend the study of such documents as the 'Greater London Plan' because they mark the initiation of great experiments which will take generations to complete. A year has passed and the Plan is in course of application—or, as some may feel, of misapplication. Yet there has been in my judgment all too little informed public discussion of its implications. The children in our schools must be taught to comprehend and to appraise the world which these social documents are seeking to evoke. Theirs is the heritage and with them will lie the ultimate decisions. Otherwise they will find themselves, to vary a now famous phrase, "more planned against than planning." Is it not a plain duty to clarify, strengthen, and if necessary remodel our geographical teaching to fit such needs and occasions?

The chief question before us here is the part to be played by Geography in the Modern Secondary Schools; of the Primary and Grammar Schools I will say nothing, for though no doubt improvements are possible, excellent geographical work is being done in both. For the Modern Secondary Schools we have no agreed curriculum, no decision on the place of Geography therein, and no clear idea of its content for these purposes. All that seems to have been done is to enunciate some high-sounding and unexceptionable principles about merging subjects and avoiding an academic outlook. The geographer, by temperament and outlook catholic and no believer in subject autonomy, will not be disinclined to cooperate with historians or to join the family of

Social Studies. There is however a real risk that, regarded by others as a junior partner in such mergers, he may find his subject merged out of existence. Most of the attempts I have seen to combine history and geography give exceeding over-emphasis to history, tactfully tincturing it with a few indifferent maps. Such will not serve, nor is there any profit in pretending that the rudiments of sociology are a substitute for Geography. What I chiefly fear, if the narrower humanists gain control, is that the physical elements of Geography will be unduly subordinated. I will venture the opinion that there is a pressing need for a strong joint committee to consider this problem, a committee on which the Royal Geographical Society, the Geographical Association, the Institute of British Geographers, and Section E of the British Association should all be represented.

May I offer finally a few concluding reflections on the argument I have presented? It is not of course my own argument; it has been stated and better stated many times. But the time has not yet come when it can be taken for granted; it needs frequent restatement with all the emphasis we can command. For the world is not yet wholly convinced; it often does not recognize modern Geography when it sees it. Some of the reviews of that recent admirable publication of the West Midland Group—'English county'—were inclined to take the line, "How much better this is than mere Geography." It is indeed better than mere Geography, whatever that may be; but it is largely the work of geographers who have obviously outgrown the limitations of "mereness." The cordiality with which such work is received enforces a further point. It is necessary to restate the geographer's case, but it is more necessary still to demonstrate it. A great responsibility rests upon those geographers who have the opportunity of demonstrating their craft in action in the field of planning. Not less is it incumbent upon us to give earnest of the value of geographical syntheses by making independent studies; we are judged not by projects but by performances.

I have referred to the need for such studies in the Colonial Empire, but their failure to appear reflects lack of facilities. Less easily can we escape blame for the fact that the regional geography of Britain is still unwritten. It is nearly twenty years since the various university schools produced, under the editorship of Professor Ogilvie, that useful but necessarily imperfect volume 'Great Britain: essays in regional geography.' As every contributor would agree, there is scope for much more than this. We have in fact been guilty, amongst ourselves, of a lack of faith in our own regional method, deeming it worthily applied by immature students in theses which rarely see the light of day. I am not forgetting the 'Land of Britain' series which partly, but only partly, fills the gap. For myself, I look to a revival of H. R. Mill's project, illustrated by his paper on "A fragment of the geography of England" published in the *Journal* in 1900.[1] This has served as the prototype for diploma and graduate theses, but it has never been followed up by senior geographers equipped with full knowledge of their subject. I would definitely include among the suggestions I have ventured to make this evening that Mill's proposal for an adequate geographical description of this country be taken up again as a research project, as a means of vindicating the geographical

[1] *Geogr. J.*, 15 (1900) 205–27, 353–78.

method and forwarding the ends of geographical education. I have said that the world is not wholly convinced by our case: when I think of the fate of Mill's scheme, I am impelled to the conclusion that the Royal Geographical Society itself was not wholly won over by the arguments of the academic pioneers. It is now sixty years since Sir Halford Mackinder—a young revolutionary, as he then described himself—read his paper here on "The scope and methods of Geography." [1] It was from this platform in 1931 that he recorded [2] "the *obbligato* of sea-faring language which then came *sotto voce* from a worthy admiral, a member of the Council of the Royal Geographical Society, who sat in the front row." If I have heard no such obbligato to-night, I am far from attributing it to my superior powers of advocacy; rather may I say that the years between have created a different mental climate which may perhaps give us the opportunity of reaping where our predecessors sowed. I remarked at the outset of this address that time is on the side of our subject—or, as I would prefer to say, of our point of view. But this can only be so if we rise to the measure of our opportunity. We have a thing to say; what is now required of us is not to declaim it in theory but prove it in action, in the class-room, in the laboratory, and in the wider world which is both the object of our study and the appointed field for its application.

DISCUSSION

Before the paper the PRESIDENT (The Rt. Hon. LORD RENNELL OF RODD) said: I will begin by saying how very pleased my Council and I are to welcome the Geographical Association here again. I hope it is the precursor of a number of meetings of this sort. The paper which you are now going to hear is by Professor Wooldridge, who needs no introduction to you. I have nothing more to add except to express the hope that the Geographical Association will go on from strength to strength.

Professor Wooldridge then read the paper printed above.

The PRESIDENT: We have listened with great interest and enjoyment to Professor Wooldridge's paper. I should like to subscribe to what he has said on the state of appalling ignorance of geography in the administrative world. I have been acutely aware of that ignorance when in contact with administrative matters and problems, and I feel Professor Wooldridge's strictures to be wholly justified. It is incumbent on all the Fellows of the Royal Geographical Society and the members of the Geographical Association to contribute to the removal of that ignorance.

I entirely agree with Professor Wooldridge on the functions of the Royal Geographical Society and of the Association in the world of geographical education. As I have often had occasion to emphasize from this platform, I regard one of the principal functions of the Royal Geographical Society to be that of advancing geographical education and maintaining contact with the academic side of geography. It certainly is the intention of my Council as of myself to establish this Society in the forefront of educational matters in geography. By that means alone will it be possible for us to contribute towards the removal of that state of ignorance to which Professor Wooldridge has referred.

[1] *Proc. R.G.S.*, 9 (1887) 141–74.

[2] *Report Brit. Assoc. Adv. Sci.*, 1931, p. 97. (Press. Address to Section E.)

You, ladies and gentlemen, will not take it amiss if I underline—not too heavily—one of the points which Professor Wooldridge made, namely in regard to the attitude of mind to geography of geographers themselves. I think there still is in some quarters a tendency for academic geographers to apologize for being geographers. Geography has been accepted. That is the recompense for the work which has been done. The time has now come to use that acceptance as a stepping-stone towards the next stage and to cease apologizing for our existence. I myself believe this to be fundamental to the success of the campaign which will have to be waged and to which Professor Wooldridge so eloquently referred in the course of his paper. No one who has conducted a campaign has achieved much by throwing doubts on the probability of his own success, or by apologizing before going into battle for the quality of his troops and equipment.

You will all join with me in thanking Professor Wooldridge for his paper and in expressing the hope that he will again address our Society. May I repeat how glad we are to welcome members of the Association, and express the hope that this will be an oft-repeated pleasure.

Professor H. J. FLEURE: It is my privilege to thank Lord Rennell and the Royal Geographical Society on behalf of the Geographical Association for very valuable friendship and support in geographical education. They have thrown open their doors to us, they have welcomed us here both this year and last year, and would have done so before had it not been for the war. We thank you very much, Mr. President, for this opportunity to meet the Society.

OXYGEN EQUIPMENT FOR CLIMBING MOUNT EVEREST[1]

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BETWEEN 1939 AND 1945 a great deal of time was spent in producing oxygen apparatus that would enable a pilot to fly in safety up to heights of 42,000 feet. At first it might be expected that such experience could be applied directly to mountaineering where the greatest height to be gained is about 29,000 feet. On further examination however it becomes clear that there are some very important differences between the two problems. Though these differences make it unreasonable to use standard aviation equipment for mountaineering, the scientific research devoted to the production of aviation breathing equipment gives many indications of the best methods of supplying the climber. Further, a great deal of technical knowledge regarding methods of transport and storage of oxygen has become available and some equipment could, with modifications, be used on mountains.

The need for oxygen at high altitudes

In the early years of the war oxygen equipment was not provided for R.A.F. aircrew in some circumstances where it was, to say the least, desirable. In

[1] The writer is indebted to the Medical Directorate of the Air Ministry for permission to publish this article.

particular I have in mind flights of eight to ten hours at heights of 12,000-14,000 feet. At these heights the gross effect of oxygen shortage, such as collapse and unconsciousness, are not seen but many occurrences demonstrated that it is unwise to fly so high for long periods without the use of oxygen. Incidents reported include errors of navigation, taking unnecessary risks, releasing bombs at the wrong time, and difficulty in moving around the aircraft or loading flares into the flare chutes. As aircraft became better equipped and aircrew better trained in oxygen use, these mistakes and difficulties tended to disappear.

Let us now examine the need for using oxygen in an attack on Mount Everest. From the published accounts of attempts on Mount Everest it is evident that the physical effects of lack of oxygen were fully realized but the more intangible effects on the mind, though mentioned, do not appear to have been fully appreciated. There are many illustrations of this; an interesting one is Smythe's impression at about 28,000 feet that his companion was still with him when he had turned back with stomach trouble some time before.[1] A possible effect of anoxia which does not seem to have been described in any book on climbing is loss of insight. Many experimental subjects short of oxygen will state, for instance, that their handwriting is perfect when they are producing a meaningless doodle.

The mental effects of oxygen shortage have been repeatedly noted in unacclimatized persons and it is not unreasonable to suppose that fully acclimatized mountaineers will also exhibit them when they go beyond the height to which they are acclimatized. The determining factor in both cases is presumably a deficiency in the oxygen supplied to the brain. During an expedition to the Andes in 1935 it was shown that Europeans could become acclimatized to heights of about 18,000 feet but that above that height deterioration occurred and increased as the stay was prolonged.[2] Shortage of oxygen on high slopes is not only probably the most potent factor affecting the physical efficiency of the climber, but it also may make him careless, forgetful, and lacking in judgment and dexterity. To climb Everest without oxygen therefore would be like climbing an equally difficult and dangerous but much lower slope in a state of alcoholic intoxication. Some of the effects of anoxia are in fact very similar to those of inebriation. A man who could climb Everest without oxygen and survive would be physically and mentally exceptional and also remarkably lucky.

In order to climb Everest using oxygen, many technical difficulties have to be overcome in producing a set suitable to be carried by mountaineers. This problem is examined below.

The problem of supplying oxygen to mountaineers

The atmosphere we breathe at sea-level consists of a mixture of oxygen (21%) and inert gases which are conveniently, if somewhat inaccurately, called nitrogen (79%); these exert a total pressure of about 30 inches of mercury. As we climb, the relative proportions of the two gases remain unaltered but the pressure is reduced, so that at 10,000 feet the pressure is

[1] Hugh Ruttledge, 'Everest,' p. 164. London, 1933.
[2] Information communicated privately to the writer.

20·5 in. Hg., at 20,000 feet it is 13·7 in. Hg., and at 30,000 feet it is 9 in. Hg. As the oxygen we breathe is the fraction of the air essential to life, the ill effects of oxygen deficiency can be overcome by breathing oxygen or oxygen-enriched air. By doing so the unacclimatized individual can maintain full efficiency up to about 35,000 feet.

If a man breathing air is taken rapidly to 23,000 feet he will become unconscious in a period varying from five minutes to two hours and he will not be fully efficient most of that time. On the other hand, if his ascent takes days or weeks instead of hours or minutes a process of acclimatization occurs and he will be able to live at 20,000 feet for a considerable time. Above this height, as already stated, acclimatization goes no further. Acclimatization is the result of several physiological mechanisms coming into play. The ones which we must consider here are the greatly increased respiratory volume which makes respiration itself arduous, and the reduced powers of the acclimatized man to go into oxygen "debt." For comparison, when an athlete sprints 100 yards he finishes the race short of oxygen, *i.e.* in oxygen "debt," which he pays for by breathing hard for several minutes. The acclimatized man cannot to the same extent produce violent effort and make up his oxygen requirements later but must do his breathing as he goes along. The blood viscosity and the load on the heart are also increased. The height-acclimatized man is thus not so efficient as the man at sea-level.

Ideally, to climb high mountains a man should breathe oxygen-enriched air from the height at which acclimatization begins—say 5000 feet—and continue breathing it till he reaches the summit. This is not a practical proposition as he would have to spend some weeks perhaps wearing an oxygen mask, which would, to say the least, be inconvenient, and the oxygen supply problem would be considerable. Further, should the supply fail at 25,000 feet he would have no chance of survival because, unlike the airman, he would have no means of descending quickly. Thus acclimatization must be accepted as a useful—and indeed the only practical—compromise at least until 20,000 feet is reached. Oxygen may then be used so that its partial pressure in the inspired air is at least as great as it is at, say, 17,500 feet. Whether this height should be 15,000 feet or 17,500 feet or 20,000 feet is at present a matter for conjecture. The middle figure is probably a reasonable assumption. At some time the following question must be answered: Does the gain in physiological efficiency by breathing a mixture equivalent to air at 15,000 feet rather than 17,500 or 20,000 feet justify the increased oxygen load?

The remainder of this article therefore is used to discuss the provision of oxygen to more or less fully acclimatized people. An important factor to be considered is the ventilation rate of the lungs which will be grossly greater than that of the unacclimatized man. This has two important results. First, the volume of airflow through the apparatus at which resistance to respiration is first noted must be high, and secondly, unless measures are taken to mitigate it, a large amount of water, and therefore heat, will be lost in the expired gas.

Specification for oxygen equipment

The climber is limited in what he can conveniently carry by both bulk and weight. A mountaineer's oxygen equipment must therefore be both small

and light and a convenient shape to carry; otherwise any physiological advantage gained by the use of oxygen may be more than offset by the encumbrance of the equipment. It should be added that, whatever the height at which oxygen is first used, the supply must be sufficient to increase the partial pressure of oxygen in the lungs at least to that at the chosen height, say 17,500 feet. With these conditions the chance that oxygen will benefit the climber is greatest. The use of inadequate quantities of oxygen should be avoided.

The following round figures are put forward as a basis for designing oxygen equipment: weight of man and equipment, 200 lb.; rate of height gain, 27·5 ft. per min.[1]; work done is therefore 5500 ft.-lb. per min. It may be assumed that where the going is easy and the above rate of climb is applicable the efficiency will not be greater than 20%, efficiency being defined as: work done/calorimetric equivalent of oxygen used above the requirements at rest. Where the going is more difficult the rate of climb and the efficiency will, of course, fall; we shall assume however that the oxygen consumption per unit time will not be altered. During descent the oxygen consumption will be reduced but the quantity necessary is difficult to estimate.

On this basis oxygen consumption measured at normal body temperature and pressure is 1·9 litres per min. What little information is available suggests that an acclimatized man using this amount of oxygen will have a ventilation volume (average volume of one breath × number of breaths per minute) of about 100 L. per min. measured at body temperature and pressure.[2] As the man inspires for only a fraction of each minute the peak rate of flow through any apparatus may be as high as 250 L. per min., again measured at body temperature and pressure.

To be successful the oxygen apparatus must in no way interfere with the respiration rhythm of the user and no appreciable work must be necessary to fill the lungs from the mask. This means that the reduction in the mask pressure below the pressure of the surrounding air at the peak rate of flow must not be great: 20 mm. of water is suggested as the maximum with the flow at 250 L. per min. This is a difficult requirement to meet but it must be emphasized that noticeable resistance to breathing may give cause to condemn an otherwise excellent apparatus. This applies particularly under conditions of acclimatization and when the apparatus is to be used for some hours. Other requirements are that the apparatus must be workable at low temperatures; it must be light, small, and reliable, and it must be simple and foolproof since the acclimatized man may be unhandy and impatient. No smell or dust must be inhaled, and conservation of moisture and heat are advantages. Oxygen should be provided for a period of six hours[3] and it should be supplied at a rate to keep the man in as good condition as if he were breathing air at 17,500 feet. It may also be an advantage to carry the oxygen in two or three containers which can be discarded when they are empty, using only one of small weight for the assault on the summit.

[1] Hugh Ruttledge, *op. cit.*, p. 218, and 'Everest: the unfinished adventure,' p. 243. London, 1937.

[2] E. H. Christensen, 'Skandinavisches archiv für physiologie,' pp. 75–6, 1937.

[3] Ruttledge, 'Everest: the unfinished adventure,' p. 244.

Methods of supplying oxygen

There are four possible types of oxygen equipment to meet these requirements: (1) a constant flow system without reservoir; (2) a reservoir system; (3) a demand valve system; (4) a closed circuit system.

A constant flow system without reservoir is so wasteful as to be ruled out immediately.

Reservoir system.—If a suitable large reservoir is included in the system, economy and reliability should result. The oxygen accumulates in the reservoir during expiration and is delivered to the face mask on inspiration. Possibly the most suitable reservoir for the purpose is a double-layer waistcoat made to a suitable volume. A waistcoat did in fact act as an oxygen reservoir in the R.C.A.F. pressure breathing equipment which was used operationally during the war (Plate 1). Another type of reservoir which was used throughout the war is the R.A.F. Economizer. Its volume (about 0·6 litre) may however be too small for use by an acclimatized man.

The oxygen flows required for either of these systems when applied to mountaineering are given in Table 1. These oxygen flows pass from the regulator (Plate 2) to the reservoir bag or waistcoat and from there during inspiration to the mask. As the lungs must complete their respiratory excursion, air must be admitted to make up the postulated ventilation volume of 100 L. per min. This is best done by spring-loaded valves in the face mask. Thus only a proportion of the inspired air passes through the tubes and resistance to breathing is minimized. With this system it would be practicable to have two settings of, say, 3 or 4 L. per min. and 6 L. per min.

Table 1.—Oxygen flows required with a reservoir system

	Alveolar partial pressure equivalent to that at			
	17,500 *feet*		20,000 *feet*	
Actual height (feet)	% *total* O_2 *necessary in inspired gas*	*Added* O_2 *L./min. N.T.P.*	% *total* O_2 *necessary in inspired gas*	*Added* O_2 *L./min. N.T.P.*
25,000	30	3·2	27	2·5
29,000 [1]	38·5	6·1	34	5·5

The system is however uneconomical owing to the fact that less than half of the inspired oxygen (30–40 per cent. under the conditions considered) is absorbed in the lungs, the remainder being lost in the exhaled air together with an appreciable quantity of water vapour and heat. To maintain both heat and water vapour some form of heat-retaining device, such as the Matthews respirator, must be considered.

Demand valve system.—A demand valve (Plate 3) is a regulator which supplies oxygen, or a mixture of air and oxygen, when suction is applied to it. The user thus gets a supply of gas in proportion to his needs. It can be so arranged that the mixture delivered is adjusted to the altitude: the percentages required are shown in Table 1. A system of this kind requires a good mask fit.

[1] It is the pressure at the top of Mount Everest which is important physiologically. Under certain weather conditions this may be less than the standard value for a height of 29,000 feet.

It is difficult to estimate the consumption of oxygen over a given period but there is no doubt that the physiological requirements of the user are well covered. As in the reservoir system, the oxygen breathed out is lost and there is again the loss of water vapour and heat. Of the two systems the demand valve is probably the lighter.

Closed circuit systems.—To overcome this waste, systems have been developed whereby the exhaled oxygen re-enters the lungs. This entails the removal of carbon dioxide from the expired gas and the exclusion of inert gases from the system. Almost pure oxygen is therefore breathed, the carbon dioxide being removed by the gas passing over soda lime in a sheet-metal canister. A reservoir, equivalent in volume at least to a deep breath, must be placed in the gas circuit.

With this system oxygen disappears only in so far as it is absorbed by the lungs. The oxygen used may be replaced by a constant addition or, better, by a demand valve arrangement similar to that described above, supplying pure oxygen only. This allows great economy of oxygen but the saving in weight is largely nullified by the amount of carbon dioxide absorbent necessary; for in order to reduce back pressure through the canister to reasonable proportions it is necessary to have a fairly large particle size and the soda lime will then absorb only about 40 per cent. of the theoretical amount of carbon dioxide. Thus a large weight of absorbent is necessary for our postulated oxygen consumption: five or six 3 lb. canisters will in fact be needed. With development, and by the use of two or more canisters together, this weight may be reduced but the reduction is unlikely to be great until an absorbent with greater efficiency (in terms of weight of carbon dioxide absorbed per unit weight of absorbent) can be found. It must be remembered that soda lime canisters should be hopper-filled to ensure even, tight packing and the contents held in place under spring pressure so that dust does not form in transit. The canisters will not operate efficiently at very low temperatures.

With this system, loss of heat and moisture are small but it has a number of disadvantages: (*a*) a perfect mask fit is required; (*b*) mask and tubing must be large and heavy since oxygen must be led to and from the mask and each lead must be fitted with a non-return valve; (*c*) the resistance to breathing may be great; (*d*) it is possible that the apparatus may become blocked by condensation of the moisture from the expired oxygen. This type of apparatus has been tried and has failed on Mount Everest though it passed all tests with unacclimatized subjects, and it is considered impractical for use in the R.A.F.

In a letter to *Nature* in 1939 [1] the then most up-to-date oxygen apparatus of the closed circuit type was criticized by Lloyd because it caused a feeling of suffocation after being used for a short period—in spite of passing all tests at ground-level and on the Alps. The cause of this feeling of suffocation was probably not only lack of oxygen, though the possibility of leaks must be considered. More likely causes were, first, the reservoir bag being too small and causing "bottoming" at high volumes; second, carbon dioxide being insufficiently absorbed, due possibly to the high velocity of gas through the absorbent or to layering of the soda lime or to the low temperature; and third

[1] Peter Lloyd, "Use of oxygen on the Mount Everest Expedition 1938," *Nature* 143 (1939) 961–3.

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1. R.C.A.F. pressure waistcoat used operationally during the war as an oxygen reservoir and to apply pressure to the chest at altitudes above 40,000 feet

2. R.A.F. Mark XI regulator designed to supply oxygen at rates of 3 or 6 litres per minute

3. *German demand valve used by the Luftwaffe, in section*

4. *R.A.F. oxygen mask type II, the most efficient mask in use by the R.A.F., incorporating a microphone*

and most important, the back pressure at high instantaneous rates of flow being great enough to cause resistance to breathing. The man using a re-breather system has a pressure of oxygen in his lungs greater than that normal at sea-level. It has been suggested therefore that the use of a closed circuit system could cause loss of acclimatization or other disturbance, and be dangerous in case of failure. The truth of this is not known, but it is considered unlikely that an effect of this nature would be appreciable during the time the apparatus is in use.

The development of an efficient closed circuit apparatus for mountaineering is therefore a complex problem which will not be solved without vigorous experimental work and testing under realistic conditions.

Methods of carrying oxygen

Oxygen can be carried (1) as a high-pressure gas, (2) as a liquid, or (3) chemically combined with other elements. At present the simplest form for storage and carriage of small quantities of oxygen is probably high pressure gas. Cylinders are robust and reliable and leakage can be extremely small. The cylinder weight however is great; that is, it is three times the weight of the contained gas if cylinders are used and about twice the weight if spheres are used. The control of oxygen delivery is also simple.

Under many circumstances the ideal way of carrying oxygen is in the liquid form. Liquid oxygen boils at $-183°$ C. at 1 atmosphere pressure and must therefore be carried in thermally insulated containers such as vacuum flasks. As the container cannot withstand the great pressures developed in a closed space, it must be open to the atmosphere or have a suitable safety valve. Because heat leaks into the containers there is a steady evaporation of oxygen; the loss is appreciable and in small containers where the surface to volume ratio is great the percentage loss is high. For use in mountaineering therefore it would be necessary to fill the portable liquid containers from the main store shortly before using them.

Under certain circumstances it is possible to reduce this loss. For instance, if the container is designed to operate at a moderate pressure (say 50 lb. per sq. in.) the loss can be zero until this pressure is reached and while the heat gained by the liquid is merely raising the pressure in the vessel. Large-size containers of this type have been used in aircraft and show no loss of oxygen for about 30 hours after filling. The pressure can, of course, be raised in a much shorter time should this be necessary. When in use, the oxygen passes from the container to an evaporator coil and thence to a regulator which is able to operate at low pressures (say 50 lb. per sq. in.).

When mountaineering, if the time between leaving the base camp and making the actual assault on the summit is long, the use of liquid oxygen is probably impracticable. But since this is by far the lightest way of carrying a certain amount of uncombined oxygen its possibilities should be investigated carefully.

Several methods of storing oxygen in a chemically combined state have been used experimentally. One method is particularly worthy of attention and with development it may become the most useful for climbing. Potassium tetroxide is a substance which, under suitable circumstances, has the

properties not only of giving up oxygen but also of absorbing carbon dioxide. It may thus be practicable to produce for mountaineering a chemical re-breather demand system in which the absorption of carbon dioxide causes the liberation of oxygen. More oxygen is produced than carbon dioxide is absorbed so that the system is self-flushing. The oxygen is produced warm, which has advantages under sub-zero conditions. As the one canister can act both as liberator of oxygen and absorber of carbon dioxide and as no regulators or high pressure unions are involved, the sub-division of the oxygen supply into two, three, or four small units should be simple; this is impracticable with the other systems and is an important point.

Candles using sodium or potassium chlorate as a source of oxygen have also been used extensively. They are reliable, have a good store life, and are safe in use. The weight of oxygen delivered is about one-third the weight of the chemical mixture used. The rate of production of oxygen for any given candle is determined by the geometry of the candle and is not controllable by the user.

Some of the particulars given above are tabulated in Table 2.

Adaptation of existing equipment

Any good aviator's mask should be satisfactory. It must have fairly low resistance to flow and good anti-freeze properties combined with sufficient sizes to fit most faces. The individual should be allowed to choose the one that fits him best. The R.A.F. mask type H (Plate 4) and R.C.A.F. mask are probably as good as any. For a re-breather circuit, modification of the mask will of course be necessary. A problem is the provision of suitable masks for bearded men. If the beard is thick it is difficult to obtain a gas-tight fit. The easiest solution is to trim the beard or, better still, shave it off.

Mask tubing should be of wide bore, unkinkable, and designed for small back pressure; the shape of corrugations can have a profound influence on the resistance to air-flow. For intermittent flow systems the R.A.F. Mk. IV tube is satisfactory. Wider tubing is probably necessary for re-breather circuits.

A reservoir oxygen system of type 2, efficient in all respects except weight and bulk, could be made from parts that are now standard and available: *i.e.* five light-weight steel spheres, total capacity 2030 litres N.T.P., weight 12 lb.; oxygen, 6 lb.; Mk. XI regulator (modified to give suitable flows), 2 lb.; R.A.F. Economizer, $2\frac{1}{4}$ lb.; R.A.F. Oxygen Mask type H, Mask Tube type IV, $\frac{1}{2}$ lb.; piping, framework, etc., 3 lb.; total, 26 lb. The oxygen mask should be provided with two air inlet valves to reduce inspiratory effort at high rates of flow. A reservoir system of type 3 could also be made from available parts: five cylinders (as above), 12 lb.; oxygen, 6 lb.; demand valve, 2 lb.; mask, mask tube, framework (as above), $3\frac{1}{2}$ lb.; total, $23\frac{1}{2}$ lb.

To produce a light-weight oxygen apparatus to meet fully the specification laid down is however not so easy though the experience gained during the war would no doubt be of great help.

Summary of proposed research

Investigations should proceed on the following lines. First, the physiological requirements which have been postulated for the purposes of this

Table 2.—Particulars of oxygen systems which might be suitable for mountaineering

Table 2.—Particulars of oxygen systems which might be suitable for mountaineering

System	*Flow rate (litres N.T.P.)*	*Weight of total oxygen (lb.)*	*Weight of containers (lb.)*	*Weight of regulator (lb.)*	*Weight of CO_2 absorbent if any (lb.)*	*Total weight (lb.)*	*Type of mask*	*Remarks*
I. Intermittent flow or demand valve	6	7	14 (as H.P. gas) 7 (as liquid)	$1\frac{3}{4}$	Nil	25 18	R.A.F. H type	1. Alveolar oxygen tension equivalent to 17,500 feet. 2. Loss of water and heat great. 3. Simple to operate.
II. Re-breather with carbon dioxide	2	$2\frac{1}{4}$	5 (as H.P. gas) $2\frac{1}{4}$ (as liquid)	Unknown	15	24 21	R.A.F. H type with 2 tubes.	1. Alveolar oxygen tension above ground-level value. 2. Minimum loss of heat or water. 3. Possibility of dust or smell from absorber. 4. Complicated.
III. K_2O_4 re-breather	3	10 (as K_2O_4)	Unknown (small)	Nil	Nil	15	R.A.F. H type.	1. Alveolar oxygen ground-level value. 2. Loss of water minimal. Heat gained from chemical reaction. 3. Self flushing. 4. Sub-division of load possible. 5. Resistance to breathing probably great.
IV. Chlorate candle with intermittent flow	6	21 (as chlorate mixture)	Unknown	Nil	Nil	30	R.A.F. H type.	1. As I but gas may be delivered hot and wet. 2. Sub-division possible.

article should be scrutinized and, if possible, tested under realistic conditions. Second, experienced mountaineers must decide such problems as the necessary duration of the supply and the desirability of using oxygen while descending. Third, the carriage of oxygen as a liquid should be studied. Research on the use of liquid oxygen for R.A.F. purposes has been concerned with containers for large aircraft. Information gained regarding methods of flow regulation might be applied directly to small portable containers.

The production of a closed circuit apparatus with low resistance to airflow should also be examined. The Royal Air Force used no closed circuit apparatus during the war, as its complexity and the difficulty of maintenance did not justify the saving in weight of oxygen. Systems of this type suitable for unacclimatized men working at high rates have however been developed. The system used for underwater purposes by the Royal Navy is of this type; whether it would be suitable for acclimatized men is a matter for investigation.

Finally, consideration must be given to potassium tetroxide as a source of oxygen and carbon dioxide absorber. Theoretically a closed circuit system using this substance would be lightest: it has no moving parts, it retains water vapour and heat, and it permits sub-division of the load to be carried.

PORT AND OUTPORT IN NORTH-WEST EUROPE

N. J. G. POUNDS

THE RELATIONSHIP between the port at the head of an estuary or at the tide limit and the port at the river mouth has become sufficiently familiar to justify the use of the terms "port" and "outport." This relationship—in some instances complementary, in others amounting almost to rivalry—has been established in the course of the last two or three centuries. The balance between port and outport has changed and in some cases is still changing. And each "pair" of ports is not strictly comparable with every other pair. Local conditions of waterway and tide, local specialization in certain commodities, concentration on trade with certain countries or continents, vested interests of shipping firms, municipal corporations, and political bodies have assisted or retarded the growth of outports, enabling them to conform in greater or lesser degree to what I shall later define as the normal pattern of relationship between port and outport.

The medieval ports of north-western Europe lay, with very few exceptions, near the tide limit of rivers at points which could be reached, not always without difficulty, by the largest vessels of the time. London, Chester, Bristol, Bordeaux, Nantes, Rouen, Bruges, Bremen were thus placed. A few, such as Hull and Plymouth, lay closer to the sea but these were not then of the first importance. All the estuary-head ports named have since been duplicated by outports. In some instances the port has suffered an absolute decline, even extinction; in others, its decline has been relative only.

In the past there was much to be said for the inland location of ports. It diminished the length of road haul, which has always been more costly than water transport and particularly during the Middle Ages; it gave protection from sea raiders, and the rise and fall of the tide was usually less than on the coast. To-day, floating basins are less necessary and may be very largely dispensed with at the inland river port, while they are indispensable at the outport. On the other hand, no river in north-western Europe has been wholly free from the danger of silting and, if used by sea-going vessels, from the cost of dredging and deepening. The more important factors in the abandonment of the river port or its partial replacement by an outport nearer the river mouth may be summarized as follows:

1. *Silting of estuaries and lower courses of rivers.*—In few instances has silting been spectacular and alone it might not have been insuperable in all but a few ports. Among these are the ports situated on the creeks and rivers of western England, including Chester, Truro, Lostwithiel, Totnes, and Exeter. On the mainland of Europe, the most conspicuous is Bruges which was forced as early as the Middle Ages to establish an outport, first at Sluis and then at Damme, by the silting of the river Zwin on which it lay.[1] Caen was similarly affected. A more recent example is Bremen, which was compelled to establish the port of Vegesack, 12 miles down the Weser, in 1618.

2. *Increasing size of vessels.*—It is difficult, if not impossible, to separate from the consequences of the silting of rivers those arising from the increasing size and draught of vessels. These increases were not rapid until the nineteenth century, by which time there were the means to deepen and maintain the river channels. Nevertheless the depth to which a channel may be cut is limited, both by the engineering problem and by the cost of the undertaking and the expectation of profit to be derived from it. The object of Franzius' development work on the lower Weser between 1888 and 1894 was to deepen the channel to 5 metres at mean high tide.[2] At Hamburg, the shallow reach of the river from Blankenese to Brunshausen was ultimately deepened to 11 metres, after earlier attempts had failed. The deep channel of the lower Seine was enlarged in the later years of the nineteenth century to take vessels of 6 metres draught. Nantes, in a situation not unlike that of Rouen, has similarly been put in easier communication with the sea, first by the Paimboeuf canal and later by the canalization of the river itself.

In general, the river-head ports tended to meet with increasing difficulties in the eighteenth and nineteenth centuries owing to the combination of silting and increasing draught of vessels. This led to the establishment or further development of outports. Since then however improvements in the waterways have arrested the decline of many ports and have even allowed them to increase their share of the combined trade. In the history of most river ports there came a time when the port authorities had to choose between the high cost of canalizing and developing the waterway and the cost of building a new port downstream. A decision was not always reached without dispute.

[1] See A. de Smet, "L'Origine des ports du Zwin," in 'Études d'histoire dédiées à la mémoire de H. Pirenne,' pp. 125–41. Brussels, 1937.

[2] Kurt Wiedenfeld, 'Die Nordwesteuropaischen Welthafen' (Veroffentl. des Inst. für Meereskunde, Heft 3). Berlin, 1903.

The tendency in shipbuilding has been to increase the size and draft of the ships, particularly of liners on regular runs, because of the economy in running larger vessels. The number of ports which the "giant" liners can reach is limited and it is not possible for them to ascend the estuaries to river ports.

3. *Ports de vitesse.*—Another factor in the growth of outports is the necessity for speed in the conveyance of passengers, mail, and certain types of freight. This was operative only after railways had made the speed of land travel greater than travel by water, and then only for passengers and those categories of goods which the increased transport rates did not seriously affect. It thus follows that the shortest possible sea crossing is used. The sea passages between the United Kingdom and Ireland—Fishguard–Rosslare, Holyhead–Dunlaoghaire, Stranraer–Larne—link the nearest points of land rather than the biggest ports or the largest centres of population on either side of the channel. In a sense, the packet stations which lie on an arc around London from Harwich to Weymouth serve as outports to the capital. Similarly Cherbourg, Havre, Dieppe, Boulogne, Calais, Ostend, Flushing, and Hook of Holland serve the larger cities of the continent. The ports of arrival and departure for Atlantic liners tend similarly to be as far to the west as is consistent with a safe site and adequate railway transport. One of the chief functions of Cobh, Plymouth, and Cherbourg is to receive passengers who then travel more expeditiously by rail to Dublin, London, and Paris.

4. *Time and cost of navigating the estuary.*—Final factors are the time taken in navigating a ship from the outport to the port itself and the high cost of pilotage and other dues. Apart from these, the relatively higher cost of land transport encourages vessels to deliver their goods as far inland as possible and, although liners may call only at an outport, cargo-liners and other shipping might be expected to ascend to the port. But it frequently happens that vessels can ascend a river only on the tide, as at Bordeaux, Nantes, Rouen, Bremen, and Hamburg. This may necessitate a wait off the river mouth and the downstream journey, made against the advancing tide, may take two tides between which the vessel is tied up in a basin. Delays due to fog and ice may be serious. It follows that it is economic for a vessel to ascend an estuary to a port only if it is to discharge or embark the greater part of its cargo. Any smaller portion is more cheaply unloaded at the outport to be moved inland by rail or lighter. The reception and despatch of part cargoes is perhaps the primary function of an outport.

I shall now attempt to evaluate quantitatively this relationship between port and outport. The net tonnage of a ship is based upon the cubic capacity of its cargo and passenger space, 100 cubic feet being considered equivalent to 1 ton. A fully laden vessel which enters a port and discharges should, in theory, unload upon the quays a cargo equal to its net tonnage. This is only approximately true. Many cargoes, especially coal and ores, weigh more than 1 ton per 100 cubic feet; 100 cubic feet of coal in fact weigh approximately $2\frac{1}{2}$ tons. The net tonnage tends to be a conservative estimate of the carrying capacity of a vessel and the dead weight tonnage is almost invariably greater. Certain types of ships, such as the tanker and the collier, have necessarily to make a return voyage in ballast but the dead weight tonnage of a collier is usually

more than twice its net tonnage.[1] For the purpose of this paper however we may take the net tonnage entering and leaving a port—each vessel being counted twice—as equivalent to the maximum cargo that could have been imported and exported if all vessels completely discharged and reloaded.

In view of the cost of navigating most estuarine channels, we should expect the tonnage of goods handled at the inland ports to approximate to the net tonnage entered and cleared. From unity or rather less at the ports, we should expect the ratio of net tonnage to tonnage of goods handled to fall at the outports and to reach a minute fraction at such ports as Cherbourg, Cuxhaven, and Le Verdon where large liners call to drop only passengers and a very small volume of cargo. The following table[2] gives this ratio for some groups of ports in north-western Europe. The relationship between port and outport in each group is then examined more fully.

	Net tonnage	*Cargo tonnage*	*Ratio*
Hamburg	103,364,365	25,257,600	0·25
Cuxhaven	3,544,848	40,100	0·01
Bremen	26,603,641	7,457,700	0·28
Bremerhaven	14,426,868	622,600	0·04
Rouen	7,973,100	8,302,016	1·04
Le Havre	20,725,600	5,292,725	0·25
Cherbourg	14,645,400	227,860	0·015
Nantes	2,081,000	2,098,074	1·01
St. Nazaire	864,500	463,873	0·54
La Rochelle	216,000	336,069	1·55
La Pallice	1,536,200	625,986	0·41
Bordeaux	4,822,500	3,325,919	0·68
Le Verdon			0·02[3]

Hamburg–Cuxhaven.—Hamburg was established on the lower Elbe, 60 miles from the sea, in the twelfth century. The site of Cuxhaven was acquired by the Hamburg State as early as the fourteenth century, but was not of potential importance as a port until the deep navigable channel of the Elbe shifted to the western side of the estuary. "Kuckshafen" was established but remained of slight importance until late in the nineteenth century.[4] Harbour works were not commenced until 1857. In the 1880's the Hamburg–Amerika line began to use the port. The basin was deepened, and the Amerikahafen was built and opened in 1896. Further extensions have been made since 1900 for the accommodation of the trans-Atlantic liners.[5]

Cuxhaven performs some only of the functions which belong to outports.

[1] This is discussed by A. Delmer in "Les ports de l'estuaire de l'Escaut, de la Meuse et du Rhin," *Bull. Soc. Belge d'Études Geogr.* 14 (1944–5) 63–97.

[2] Based on 'Tableau Générale de la Navigation Extérieure, 1937,' pp. 364–81. Paris, 1938.

[3] The ratio for Le Verdon is based on estimates only.

[4] See E. J. Clapp, 'The port of Hamburg,' p. 69. Yale, 1911.

[5] A detailed account of the equipment of Hamburg and Cuxhaven is given in *Dock and Harbour Authority*, vols. 12 and 13 (1932).

It is, as it was in the Middle Ages, a harbour of refuge; a quarantine, pilot, and marine signalling station, and a large and well-equipped fishing port. But above all it has been in recent years the most important German port for the trans-Atlantic passenger traffic and the port of departure for the vessels of the Hamburg–Amerika Line. It is scarcely used for the export and import of cargo, which is almost confined to the requirements of the immediate vicinity. Hamburg, on the other hand, is the foremost German port both in the volume and in the value of cargo. It is the most easterly of Atlantic ports. Its hinterland, with which it is in easy communication, embraces a great part of central Germany. It is a terminal port and, as long as its waterway is navigable, requires an outport merely as a *port de vitesse*.

In the table above, the coefficient of utilization for Hamburg is seen to have

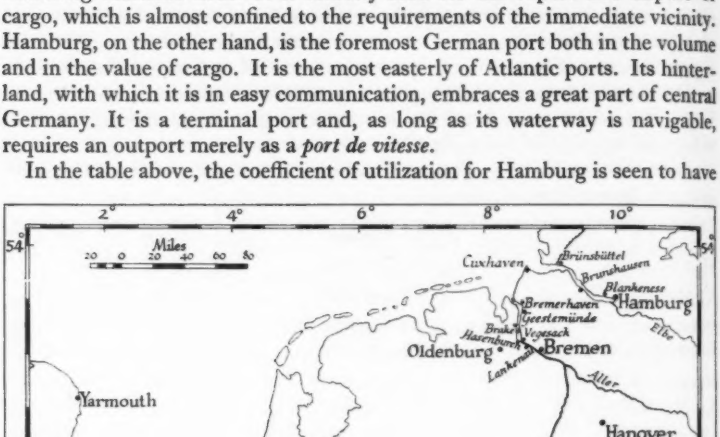


Figure 1

been 0·25; that of Cuxhaven, 0·01. The differentiation may be taken as normal between port and outport, although Cuxhaven fulfils only one of the two major functions of an outport—the reception and despatch of large ocean liners carrying more passengers than freight. The coefficient for Hamburg itself may seem rather low; this may be attributed partly to the nature of the cargoes, in which coal and ores are negligible, partly to the fact that Hamburg is, for many incoming cargo-liners, the last of a number of north-western European ports of call.[1]

Bremen–Bremerhaven.—The port of Bremen, one of the foremost of the Hansa towns, lies on the Weser, 65 kilometres above Bremerhaven. The river, which had sufficed for the medieval traffic of the town, was shallowed by silting in the sixteenth century and trade was vexed by the imposition of tolls by

[1] The ports of origin of incoming vessels are given in *Statistik des deutschen Reichs: Die Seeschiffahrt im Jahre* 1937.

the riverine states. A harbour was established in 1618 at Vegesack, 12 miles downstream, and another later at Brake, 14 miles lower. These gave only temporary relief and in 1827 the city-state of Bremen founded the port of Bremerhaven on a site purchased from the State of Hanover. Twenty years later Hanover established Geestemünde, now absorbed into Bremerhaven, to share in the trade which promised to be lucrative.[1] Nevertheless the installations at Bremen seemed to warrant the improvement of the waterway up to the port itself. Obstacles were raised by the states of Oldenburg and Hanover, which in part controlled the banks of the lower river,[2] and it was not until 1888 that these were removed and L. Franzius began his work on the river. The bend between Lankenau and Hasenburen was cut across and by 1894 a channel was completed to take vessels of 5 metres draft at high water from the sea to Bremen.[3] The river has since been deepened further and a channel of 9 metres is now maintained by dredging. The trade of Bremen mounted steadily during this period, particularly after the German government had instituted preferential rates on the State railways between Bremen and the Rhineland. Bremen remains second in importance only to Hamburg in the handling of bulk cargoes and is specially equipped for cotton, wheat, and coal.

Unlike Cuxhaven, Bremerhaven has evolved both the major functions of an outport. On the one hand it is the German terminus of the Nord-Deutscher Lloyd and handles a passenger traffic second only to that of Cuxhaven; on the other, it is a cargo port for vessels which cannot or do not sail up-river to Bremen. In 1937 the coefficient for Bremen was 0·28 and for Bremerhaven 0·04. The two ports demonstrate another feature not uncommon in the relationship of port and outport, a barge or lighter traffic by which goods unloaded at Bremerhaven are carried inland to Bremen.

Rouen, Havre, and Cherbourg.—This group of three ports is closely associated with Paris. Rouen is the oldest and in the Middle Ages was a commercial port of some importance. "Le Havre de Grâce" was established by François I in 1517, but it was not until late in the eighteenth century that any considerable development of the small town and its dock facilities took place. As a settlement, Cherbourg is older than Le Havre, though the establishment of the port was begun only in the mid-eighteenth century. Much of its dock facilities date from the latter half of the nineteenth and the twentieth centuries when Cherbourg began to function as a port of call.

Rouen lies 65 miles from the sea. Navigation of the lower Seine is hindered, not merely by the depth of water which permits only vessels of up to 20 feet draft to use the waterway, but also by the sharp bends which limit the length of the vessels. Vessels can normally ascend on the tide at a speed of about 10 knots, but the return voyage has sometimes to be made on two tides by deeper draft vessels which tie up at La Corvette during the intervening low water.

The relationship between the net tonnage and the cargo handled at Rouen

[1] F. Schnabel, 'Deutsche Geschichte im neunzehnten Jahrhundert,' vol. III, p. 400. Freiburg im Br., 1934.

[2] W. O. Henderson, 'The Zollverein,' pp. 155–261. Cambridge, 1939.

[3] Wiedenfeld, *op. cit.*, pp. 125–6.

is a normal one for an inland port. In 1937 the ratio was 1·04 and had approximated to unity for many years.[1] The average size of the vessels using the port is less than a third that of the vessels using Le Havre, a result in part of the difficulties of the channel, in part of the large share of colliers in the trade of the port. The trade of Rouen, as of most French ports, is ill-balanced, the tonnage of imports being nearly twenty times that of exports. This is largely

Figure 2

accounted for by the great volume of imported coal, which amounted to almost half the total trade of the port in pre-war years. Petroleum, ores, minerals, and chemicals figure next in the table of imports. In 1937 the ratio of cargo handled to net tonnage at Le Havre was 0·25 to 1. This is accounted for partly by the reception and despatch of part-cargoes, the normal function of an outport, but also by the fact that many of the goods handled, particularly food-

[1] J. Bruhnes and P. Deffontaines, "Géographie humaine de la France," in 'Histoire de la nation française' (Ed. G. Hanotaux), tome II, p. 305. Paris, 1926.

stuffs and textile raw materials, are inherently light. There is traffic between Le Havre and Rouen by the Tancarville Canal (Fig. 3), which obviates the long passage around the shallows at the Seine mouth. The volume of goods "lightered" up to Rouen through this canal in normal years amounted to about a third of that handled at Le Havre.

Cherbourg is almost exclusively a port for the trans-Atlantic traffic. Its immediate hinterland is restricted and its local trade is negligible. Remoteness from the industrial centres of France restricts its use as a commercial port, while the speed of the journey to Paris (370 kilometres in less than five hours) has made it the chief port for passengers to and from North America. Cherbourg is functionally a packet station, and its 1937 ratio of 0·015 is an indication of the small importance of bulk cargoes. If Le Havre is the Bremerhaven of France, Cherbourg is her Cuxhaven.

Rouen remained, up to the eve of the war, the French port handling the greatest volume of goods, but the variety of commodities has long been

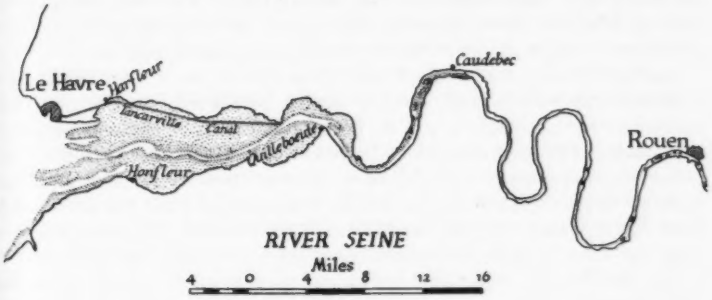


Figure 3

increasingly restricted.[1] In particular, the cotton trade, formerly important at Rouen, has passed almost wholly to Le Havre, where cotton is railed to the spinning towns of the Seine basin. This narrowing of the trade of Rouen is balanced by an expansion and diversification of the trade of Le Havre. The deepening of the Tancarville Canal was intended not so much to facilitate the up-river traffic as "to establish on the banks of the canal an industrial zone in which raw materials, brought right up to the factory by vessels from abroad, can be put in process of fabrication."[2]

Nantes–St. Nazaire.—Like Rouen, Nantes was formerly a port of relatively great importance, easily reached by sea-going vessels and fed from inland by the traffic of the navigable Loire. During the first half of the nineteenth century, difficulties began to accumulate in the lower part of the river and in 1856 the Bassin de Saint-Nazaire was opened on a site chosen over fifty years earlier for a dock which had never been built. A few years later a second dock was opened. Nantes, like so many other inland ports at this time, struggled to arrest the decline of its trade. The upper section of the estuary, from below

[1] J. Levainville, 'Rouen,' p. 138. Paris, 1913.
[2] *Dock and Harbour Authority*, 14 (1934) 105.

Le Pellerin up to Nantes itself, was embanked. A plan to cut a navigable channel through the maze of sand banks in the middle section was abandoned in favour of a lateral canal, 9½ miles long, from La Martinière to le Carnet. This was opened in 1892 and led to an immediate recovery in the trade of Nantes. Further difficulties arising from the increasing size of vessels led to a revival of the original project. Embankments have been constructed in the estuary and a navigable channel excavated.[1]

Throughout the eighteenth century, Paimboeuf served as the outport of Nantes and was considered as an alternative site to St. Nazaire for a wet dock. Before the works were carried out on the river, vessels here discharged part of their cargo into lighters to reduce their draft before sailing up to Nantes.

Nantes is a terminal port; in 1937 its ratio was 1·01. St. Nazaire is a port of call and a ship-building port with heavy industries and an import of coal for local consumption. Its ratio, 0·54, was thus higher than is perhaps normal to an outport. Between St. Nazaire and Nantes is a group of small ports each associated with local industries. The trade of each is small but, except in the case of Couéron, their ratios are high. They are terminal ports, receiving petroleum, coal, ores, and chemicals for the local manufactories.

La Rochelle–La Pallice.—La Rochelle lies not on a river but at the head of a narrow bay where small, shallow basins have been constructed. These sufficed for the medieval trade of the port and in modern times small additions were made. The shortcomings of La Rochelle as a port lie less in the silting of its waterway than in its inability to accommodate the increasing size and draft of ships. The port of La Pallice was founded after the La Rochelle Chamber of Commerce had decided in 1873 to establish a deepwater port, as near the older port as convenient, to share in the growing trans-Atlantic traffic. In 1890, the dock of La Pallice was opened, nearly 4 miles to the west of La Rochelle on the deep water of the Rade de la Pallice, the channel which separates the Ile de Ré from the mainland. The trade of La Rochelle is relatively small, consisting overwhelmingly of the import of coal. This is reflected in its abnormally high pre-war index of 1·55. La Pallice has a larger and more varied traffic, but its ratio of 0·41 is raised by the import of fuel, coal, and petroleum, which amount to nearly half the total trade.

Bordeaux and the Gironde Ports.—Bordeaux, 98 kilometres up the Gironde, is one of the least accessible of the inland ports of north-western Europe. The waterway is shallow and its deep channel is liable to shift. Furthermore, the mouth of the Gironde from the Pointe de Grave to the Pointe de la Coubre is obstructed by a bar at less than 3 fathoms depth at low water. In the years between the two wars, dredging operations were carried out and the Grande Passe de l'Ouest was opened along the northern shore of the estuary.[2]

The trade of Bordeaux grew slowly in the eighteenth and early nineteenth centuries and more rapidly in the second half of the nineteenth century.[3] In 1894 it became necessary to establish an outport at Pauillac where vessels could be lightened by discharging part of their cargo into "gabares" before

[1] See "Ports of the lower Loire" (*anon.*), *Dock and Harbour Authority*, 16 (1936) 273.

[2] A detailed account of the Gironde estuary and of the problems of maintaining a channel is given in *Dock and Harbour Authority*, 18 (1937–8) pp. 15, 52, 85, 116.

[3] See H. Lorin, "Bordeaux: La Gironde," in 'Les grands ports français.' Paris, 1921.

continuing up to Bordeaux. The deep channel was further improved but the necessity for a deep-water outport increased. Plans were drawn up as early as 1910 for a deep-water port at the mouth of the estuary. Abandoned during the first world war, they were revived in 1918 and took final shape in 1923. Work proceeded on the quay at Le Verdon, which was formally opened on 22 July 1933 by the visit of the *Champlain* to disembark passengers. The port consists of a jetty built out into deep water within the curve of the Pointe de Grave. It serves both as a port of call for vessels which sail no farther into the Gironde and as a point of disembarkation for passengers who choose the more speedy railway journey to Bordeaux. It is too soon to say whether the early anticipation that Le Verdon would place Bordeaux on the itinerary of passenger and cargo-liners from north-west European ports and "tap the stream of passengers and valuable goods proceeding from or into Bordeaux and the neighbouring regions of the South-west, the Centre and the South of France" [1] will be justified.

As on the Lower Loire, there are a number of lesser ports between Le Verdon and Bordeaux, all of them primarily terminal ports importing mainly coal and mineral oil. Pauillac is the most considerable of these, followed by Bec d'Ambes, Blaye, and Mortagne. All handle, in varying proportions, coal, petroleum, and timber and resemble the corresponding ports of the Loire.

The ratio of cargo handled to net tonnage at Bordeaux before the war was 0·7. This is a comparatively low ratio for an inland port in France; here the import of coal forms a smaller proportion of the total trade than in other ports similarly placed. The ratios were very much higher for the lesser Gironde ports handling heavy cargoes: Pauillac, 1·02; Bec d'Ambes, 1·1; Blaye, 0·97; Mortagne, 1·7. The ratio for Le Verdon was very low, 0·022, but this may rise as more cargo-liners are attracted to the port.

Ports of the British Isles.—The relationship of port and outport is less significant in the British Isles than in north-west Europe.[2] The only example which bears any close resemblance is provided by Bristol and Avonmouth. Until the late nineteenth century the lower Avon remained sufficiently navigable, and, if we exclude the dock built in 1712 at Sea Mills and later abandoned, no attempt was made until the 1870's to establish an outport. By then however the increasing size of ships made the river navigation more difficult. A heated controversy arose; rival schemes were put forward in Bristol for the canalization of the river and the opening of an outport. The latter triumphed and in 1877 and 1879 respectively rival outports were established at Avonmouth and Portishead.[3] In 1884 both were acquired by the Bristol Corporation and they remain part of the municipally owned port. It is however impossible to compare the utilizations of the ports of the Bristol Avon as we have done those of the continent, because for statistical purposes Bristol and Avonmouth are treated as one port.

[1] *Dock and Harbour Authority*, 14 (1934) 153.

[2] A short and not wholly satisfactory account of the trade of each British port is given in Sir David Owen, 'The origin and development of the ports of the United Kingdom,' London, 1939.

[3] There is a brief discussion of this in F. Walker, "The port of Bristol," *Econ. Geog.* 15 (1939) 109–24.

The ancient focus of London's sea-borne trade was the Pool, below London Bridge. This shifted downstream to the dock area below the Tower during the nineteenth century, owing rather to congestion at the wharves of the city than to any shortcomings in the navigable channel. Soon after 1800, the West India Dock was opened and was followed by the opening of the East India, St. Katherine, Victoria, Millwall, Royal Albert, Surrey Commercial, and King George V Docks. London Docks have found no difficulty in expanding to take the largest vessels likely to call and, as London is a terminal port receiving large quantities of bulk commodities, there has been no need for an outport. Nevertheless the Tilbury Docks were opened in 1886, some 26 miles below London. There appears to have been difficulty in getting trade for Tilbury and it engaged in a price-cutting war with docks nearer the capital which was terminated only by the union of the dock companies concerned.[1] In the scheme of the Port of London Authority, Tilbury is a *port de vitesse*, a passenger port and the packet station nearest the capital. As already stated, the ports of south-eastern England from Harwich to Weymouth can be regarded as outports for London. In each, except Southampton which is a port in its own right, the passenger traffic is relatively very important.

Two trans-Atlantic *ports de vitesse* require mention, Plymouth and Cobh. The trade of Plymouth is restricted by the poverty of its hinterland, but as a port of call for trans-Atlantic liners it has assumed a considerable importance. It may almost be regarded as a distant outport of Southampton. The relations of Cobh and Cork reproduce on a small scale those of the Weser or Loire ports. The medieval trade of Cork succumbed to silting and in the eighteenth century vessels discharged at Cobh or Passage. The formation in 1820 of a Port Authority was followed by dredging, and the port of Cork took on a new lease of life. At the same time, liners began to call at the Outer Harbour to drop passengers.[2]

There are in England two examples of an "inverted" port and outport relationship. Of the ports of the Humber, the port of Hull is both older and nearer the sea. Goole was established early in the nineteenth century as a result of industrial development in the West Riding and of the canalization of the Aire and Calder. We have here two terminal rather than complementary ports. The relationship of Liverpool and Manchester is similar and arises from the intensive industrialization of the hinterland long after the establishment of a port near the sea. Brindley's canal to Runcorn (1774) anticipated the Ship Canal, which was authorized in 1885 after interests in Liverpool had tried to prevent the passage of the Act. The canal was opened in 1894 and the limit of ocean navigation was put back 30 miles from the sea. There has been no marked differentiation of functions between Manchester and Liverpool; both must be regarded as terminal ports and to that extent competitive.

We have seen that outports combine a variety of functions, which suggests that they may be classified into three far from exclusive groups:

(1) Ports which, owing to the silting of an estuary or the shallowing of a

[1] Sir David Owen, *op. cit.*, pp. 48–9.

[2] J. J. Horgan, "The port of Cork," *Dock and Harbour Authority*, 15 (1935) 273.

river, have completely or almost completely superseded the port farther inland, leaving to it at most the occasional visits of coasting craft.

(2) Packet stations, where freight is wholly subordinate to passenger traffic.

(3) Ports of call, "outports" in a restricted sense, whose relationship to the inland ports is conditioned by the cost and difficulties of navigating the intervening stretch of water.

The characteristics of outports may be summarized as follows:

First, a low ratio between tonnage of merchandise and net tonnage of shipping. There is however a tendency for outports to develop manufacturing industries, assisted by the relatively cheap water-transport and leading to the import of more bulky raw materials. The outport thus becomes, if only in part, a terminal port, as St. Nazaire and Le Havre have become for fuel, particularly coal, and certain raw materials. The location of industries in the outports is favoured also by the tendency, seen during the present century, for manufacturing industry to become more dispersed and less dependent on close juxtaposition to the coalfields. The coefficient of utilization for these outports may be expected to increase.

Secondly, lighterage, though by no means a universal characteristic of the waterway between the outport and its port, is conspicuous on the Weser, Seine, and Thames. Its importance depends largely on whether a considerable proportion of the goods handled in the outport are destined for consumption in the port, as at Havre where much of the material for the textile mills is lightered up to Rouen.

Thirdly, there is a tendency to handle relatively light and valuable cargoes, able to bear the cost of the land journey more easily than the bulky cargoes, which are carried direct to the inland port.

The cost of freighting a fully laden ship from a distant port does not normally differ between port and outport. The ship is therefore likely where possible to be routed to the port. But the ship moving along the coast and calling at several ports is likely, for reasons already given, to call at the outport. On the other hand, ports are more accessible to vessels of shallow draught than are outports, and the cost of sailing up to the port is proportionately less. Levainville described Rouen, with slight exaggeration, as a port for the coasting trade.[1] Statistics are inadequate for a complete analysis of this aspect of a port's trade, nor is the distinction between coasting and ocean trade sufficiently clear.[2] We can however be certain that a fourth characteristic of the outport is that the average size of vessel calling is much larger than at the inland port.

One might perhaps, following the technique of the physical geographer, outline a cycle of evolution for an outport. In such a scheme, Cuxhaven, Cherbourg, and Le Verdon would be immature, dependent on fast passenger traffic. A middle phase might be represented by Bremerhaven or Havre, which handle valuable part cargoes. St. Nazaire would be verging on maturity, with its own manufacturing industries and a rising coefficient of utilization. If one postulates a considerable diminution of the import of English coal into France, it is difficult to see how some French inland ports

[1] J. Levainville, *op. cit.*, p. 139: "Rouen est resté un port de cabotage."

[2] Sir Osborne Mance, 'International sea transport,' pp. 112–15. London, 1945.

could maintain their position; in that case, French outports might rapidly attain a stage of maturity. But, as the physiographer reminds us, no cycle is accomplished without interruption; rejuvenation is always possible.

ON GEOGRAPHERS

From the Dedication of Richard Willes' 'The History of Travayle,' 1577.

Who but Geographers doe teach us what partes of the earth be colde, warme or temperate? Of whom doe we learne how to divyde the world into partes, the partes into provinces, the provinces into shires? of Geographers. Unto whom have wee to make recourse for Mappes, Globes, Tables and Cardes, wherein the dyvers countreys of the Worlde are set down? unto Geographers. Set Geographie asyde, you shall neither be able to get intelligences of the situation and strength of any citie, nor of the limites and boundes of any country, nor of the rule and government of any kingdome, nor be able wel to travayle out of your owne doores. Wil you see what wise and experte travaylers, skilful in geometry and astronomye, (for that is to be a Geographer in deede) be able to doe? Looke you on the King of Portingales title: the two partes, of the three therein, were achieved by Vasques Gama, and other travaylers adventures. Consider the fruites, the drugges, the pearle, the treasure, the millions of golde and silver, the Spanyardes have brought out of the West Indies since the first viage of Columbus. The great commodities our nation reapeth by the travayle of our countrymen into Barbary, Guiny and Moscovia, wil be sufficient testimony unto all us Englishmen, what it is to be a skilful travayler, what to bee a paineful Geographer, and learned.

THE LAND AND THE PEASANT IN THE MIDDLE EAST

PAYSANS DE SYRIE ET DU PROCHE-ORIENT. By JACQUES WEULERSSE. (Le Paysans et la Terre, No. 3.) *Paris: Gallimard*, 1946. 9×5½ *inches;* 330 *pages; maps, diagrams, and illustrations*

THE AGRICULTURAL DEVELOPMENT OF THE MIDDLE EAST. By B. A. KEEN. (Report to the Director-General, Middle East Supply Centre, 1944–45.) 9½×6 *inches;* xii+126 *pages; illustrations and folding maps.* 5*s*

FRENCH POLITICAL action in the Levant has been much criticized, but there can be nothing but praise for the work of French scholars and scientists who have found opportunities under the mandate to enrich our knowledge of the Near East. M. Weulersse's volume (we regret to learn that the author died prematurely in 1946) is a penetrating study of life on the land in Syria and Lebanon; it forms part of a series, 'Le Paysan et la Terre,' which aims to describe, analyse, and interpret different types of peasant societies. Earlier volumes have dealt with French West Africa and with village life in France.

The physical background of climate, soil, and water is described with admirable lucidity, and the technique of agriculture is given adequate treatment, but the emphasis is on the *fellah* as a human being and a social type. His manners and customs, his daily life, his mental outlook, and his place in society are described from first-hand knowledge and with understanding. In many respects the fellah presents a striking contrast to the European peasant, who is attached to the soil by stronger bonds than those of economic necessity. The social ideal of the Arab world is the nomad life of the desert, and the settled folk know neither love of the soil nor pride in their work. In contrast to the life they lead, their deepest reactions are influenced by the nomad conception which despises manual labour and exalts pride in blood above the well-being of a stable society. The villager is oppressed by a feeling of social and spiritual inferiority; his loyalties are given to family and tribe and religious community, but there is no emotional response to the claims of the nation and the state. With the simple virtues of a tradition-bound patriarchal society, he combines the faults of a backward and oppressed social group. Under a chaotic system of land-tenure the fellah is everywhere in a state of dependence and subject to economic exploitation. Immense estates are owned by townspeople who have no roots in the soil; on the borders of the desert there is often a feudal relationship to a Badawin chief, and the mountains of Lebanon, the Hauran, and the Alawite country are the feudal domain of a few great families. The small farmer working his own land is an exception, and in general the rule obtains that "qui cultive ne possède pas, et qui possède ne cultive pas." The towns are parasites on the country, which they exploit without putting back anything to raise the standard of life in the villages. The forms of land tenure are many and various but the result is everywhere the same: ruthless exploitation by landlords who take no interest in the land except as a source of revenue, and feudal dependence without the human relationship between the manor house and the village which formed the brighter side of feudalism in western Europe. The *métayer* in the plantation areas, where vines, olives, and citrus fruit are grown, is better off than the fellah of the grain-growing plains; the terms of tenancy (*mughárasa*) even favour the growth of a new class of peasant-proprietors, but the regions to which the system can be applied are limited in extent. The formula which best describes

the life of millions of fellahin in Syria, Iraq, and Palestine is: small-scale cultivation based on the family, within the social framework of village life, under the oppressive rule of urban landlords. "Condemned, it would appear, as always in the past, to toil on the land they do not own, for the benefit of masters who are indifferent to their lot, the peasants, equals amongst themselves in their misery, support the whole weight of the social structure. The whole mechanism of the social order, with its system of land tenure and economic exploitation and the bondage of debt, thus works against the peasant who supports it, and it seems designed to keep him for ever in a state of abject serfdom."

The peasantry has had no share in the progress of education and in the introduction of westernized ways of life which have brought about such remarkable changes in the towns. Agricultural technique remains primitive owing to the backwardness of the fellahin and the reluctance of the landowners to provide capital for improvements. The Koran schools found in many villages confine themselves to the traditional religious teaching, and the efforts of the mandatory power to devise a modern system of secular instruction for the countryside has had little success because of the resistance of the land-owning interests and the indifference of the villagers themselves. Here M. Weulersse pertinently observes that the insistence on classical or literary Arabic even in the most elementary stages of education tends to defeat its own object. "The fellah child has to acquire what is to all intents and purposes a foreign language, a language moreover rendered particularly abstruse by its archaism and its system of writing, and it is not surprising that he fails to master it."

It is not only in the sphere of education that French reforming zeal was unable to overcome the formidable obstacles which beset "le problème fellah." The terms of the mandate gave the administration no security of tenure, and political difficulties interfered with the orderly processes of government. The work of land registration, undertaken as a preliminary to the reform of land tenure, remains uncompleted; irrigation projects were seriously studied but could not be carried out. There was a great improvement in communications, and the fellah benefited from the public security of the pax franco-gallica, but in all essentials his condition remained static. "L'évolution des vingt dernières années (1919–1939) n'a pas résolu le problème fellah."

For this failure the French administration cannot in justice be blamed, and it is well to remember that neither Egypt nor Iraq have better results to show in their treatment of rural problems, while in Palestine, as M. Weulersse points out, Zionist settlement has transformed the scene out of recognition. "La réussite a été éclatante, mais de quel prix n'a-t-elle pas été payée!" A postscript written in January 1946 reviews the latest developments. With the termination of the French mandate in the Levant, political power has passed into new hands but the social structure remains unaltered. The new rulers belong to that urban aristocracy of rank or wealth which has dominated the countryside for centuries, and they will use their new power to reassert their supremacy. There will be neither money nor enterprise for projects of irrigation and rural development. The political outlook is uncertain, and on the borders of the desert the nomad once more threatens the peaceful cultivator.

It is impossible in a brief review to do justice to the rich contents of this book. Written with admirable detachment and a profound respect for facts, it is a model of what a regional study should be. The rural problem of the Near East tends to be overlooked by many observers of the political scene, as it is neglected by the ruling classes of the Arab states, but on its solution, M. Weulersse concludes, will depend to-morrow's structure of the Near East and the future of that Arab civilization which is striving towards its rebirth.

It was not part of Mr. Weulersse's plan to discuss ways and means of reform. His analysis however finds confirmation in the reports of the scientists who, under the auspices of the Middle East Supply Centre, studied the varied problems connected with the development of agricultural resources in the interests of war economy. To their reports, reviewed elsewhere in this *Journal* (109 (1947) 109–12), 'Paysans de Syrie' and similar demographic studies form a necessary complement and, read in conjunction, they show that the technical problems of restoring prosperity to a decaying economy cannot be separated from the human problem of raising the standards of a depressed peasantry. Dr. B. A. Keen, the author of one of these reports, 'The agricultural development of the Middle East,' has given due attention to the factors of land tenure and social organization under which, as he observes, a sense of responsibility for the well-being of the land and its workers did not develop. It was outside his scope to consider the political implications of planning for agriculture, yet these are of primary importance, particularly in the states which have recently passed from tutelary regimes to complete independence. So far rural betterment, where it exists, has sprung from foreign enterprise through the use of foreign capital and of imported technical skill. Italian colonization schemes in Libya had some commendable features, and the Zionist achievement in Palestine has been remarkably successful in its technical and economic aspects. Yet there is no need to labour the point that economic progress rests on insecure foundations where it is associated with political maladjustments capable of arousing intense human passions. The brightest spot on the map is the Sudan where the Gezira Scheme, a tripartite partnership between the government, a commercial syndicate, and the working tenant-farmer, has been an outstanding success, not only because it provides revenue for social services and dividends for shareholders, but because it gives the people who work on the land a higher standard of living and an immensely improved social outlook. Those who benefit from it moreover are not colonists or immigrants from abroad but the indigenous people of the country whose roots are in the soil which they cultivate.

Dr. Keen, inspired perhaps by the example of the Sudan, commends the Public Utility Corporation as the most suitable agency for implementing the vast changes which are necessary in order to make the best possible use of the land, and he is fully conscious of the fact that such undertakings imply a radical break with the traditional forms of land tenure and thus with the whole social structure. The question necessarily obtrudes itself whether there can be a favourable atmosphere for a new deal in countries where political power is largely in the hands of the privileged few who benefit from the existing system. Dr. Keen takes the optimistic view that education, such as given for instance in the American University of Beirut, will awaken the coming generation of land owners to a sense of their responsibilities, yet to most observers it would appear that the problem is much too urgent to wait for the emergence of a new class of benevolent and improving landlords. History, as Dr. Keen himself reminds us, shows "that if the problem of the absentee landlord is allowed to drift, it is liable to be solved by an agrarian revolution."

In Egypt public opinion, under the pressure of over-population and unemployment, is gravely and urgently conscious of the need for reform, and the government is working on a four-year plan of social legislation by means of which it is hoped to improve the lot of the fellahin. Iraq also has her schemes of agricultural development, though her problem is complicated by lack of manpower which contrasts strikingly with the over-population of Egypt. The questions treated by M. Weulersse and the scientists of the Middle East Supply Centre are thus found to be very much in the forefront of discussion, yet it still

has to be shown that effective reforms are possible without a shift of political power in a democratic sense. Palliative measures which demand comparatively little of the wealthy few while leaving the social structure unchanged in its main features will not satisfy the underprivileged in the long run, and signs are not lacking that in the play of political forces rival parties will compete for their support. In the last resort the prosperity of the land and the well-being of the fellahin depend as much on well-directed political action as they do on the application of scientific knowledge and technical skill. S. HILLELSON.

JUNGLE TRIBES OF THE DECCAN

THE ABORIGINAL TRIBES OF HYDERABAD. I, The Chenchus: jungle folk of the Deccan. II, The Reddis of the Bison Hills: a study in acculturation. By CHRISTOPH VON FÜRER-HAIMENDORF. *Bombay: Macmillan*, 1943 and 1945. 11×7 *inches;* xxii+392 and xvii+374 *pages; illustrations and maps.* Rs.20 (35*s*) *each*

THE FIRST OF these volumes deals with an Indian tribe inhabiting hilly country in southern Hyderabad and extending over the Kistna River into Madras Presidency. Most of Baron von Fürer-Haimendorf's work is devoted to the "jungle Chenchus" of the upper plateau just north of the Kistna River, but there are chapters on the "village Chenchus" living farther to the north and on the Chenchus of Madras Presidency.

The jungle Chenchus have an extremely primitive type of economy. Though some cattle are kept and certain individuals cultivate a little grain, these Chenchus live essentially by hunting and food collecting, the latter activity being the more important. Their villages are the centres of well-defined tracts of territory belonging to the village communities. Villages are generally inhabited during the rainy season, but when the weather becomes hot and dry most villages break up into their component households, or groups of households, and migrate to temporary settlements where they form *ad hoc* local groups. This is done partly from necessity—the need for seeking areas where water and forest produce are more plentiful than around the villages—but also partly from inclination. The migrations, which are fairly elastic, provide opportunities for varied activities, such as fish-poisoning in the pools of the Kistna river, collecting wild honey from the cliffs along its banks, and gathering mohua flowers which are used for the distillation of liquor.

Apart from their food supply, the Chenchus are largely dependent upon external trade for items of dress and ornament, tools, household goods, and "luxury" foods for provisioning ceremonies. In return they export ghee, calves, forest produce, and baskets, and also do a small amount of casual labour. Like other primitive Indian tribes, they are systematically swindled by the outside traders. A useful appendix (pp. 370–1) showing values of items of income and expenditure gives a clear picture of their extreme poverty. "Even measured against the standard of other aboriginal tribes of the Deccan, the needs and resources of the Chenchu are exceedingly small, and his style of life far lower than that of the poorest Hill Reddi or Gond" (p. 83).

The treatment of the human ecology of the Chenchus and the practical suggestions for its betterment are by far the most valuable contribution of this book.

Anthropologically it is disappointing. The treatment of Chenchu culture, and of social organization in particular, is superficial and confusing. To take one illustration, the discussion of *peddamanchi* (headmen of village communities) gives no conception of the exercise of authority. We are told that "considering the degree of uncertainty attached to the succession of *peddamanchi* as well as their lack of prominence at functions, we may well conclude that the institution is not deeply rooted in Chenchu culture" (p. 122). Yet the *peddamanchi* constantly appear throughout the ethnographic record, feasting at the expense of wrongdoers (the Chenchu form of "fine"), settling minor disputes, securing acceptance of a breach of clan exogamy by condoning it, and invoking the gods. This is just what we would expect of an institution of headmanship "deeply rooted" in the culture of a primitive people who do not take their patrilineal succession too seriously.

The weakness of the ethnographic record is due partly to the shortness of the period of field work (about six months) and the fact that all work was done through an interpreter, but even more to the methodological approach, which is fragmentary and static rather than functional and dynamic. This is linked with a predominantly historical view of the problems involved. For example, the author is so preoccupied with looking back into the supposed history of Chenchu clans and their possible previous association with territorial groups that he fails to describe in detail the present inter-relationships of clan and village community. Very vital relations may exist between clan and local group, apart from perfect association. But the problem of such relations is obscured to Fürer-Haimendorf by concentration upon an ideal organization in a hypothetical past when clan and village community are assumed to have been identical. Again, the assumption that the *peddamanchi* were formerly of less importance than now is associated with the limited view of their functions to which reference has been made.

The chapter on the "village Chenchus" describes a group which practises, partially or wholly, an agricultural economy comparable with that of their Hindu neighbours. In certain villages this adjustment is, by Indian standards, satisfactory. But in others, economic conditions are worse than among the jungle Chenchus. "A factor that greatly augments their economic difficulties is the unfortunate desire to ape the manners of other castes in their expenditure at weddings, for this runs them into debt and increases their dependency" (p. 304). The chapter concludes with some suggestions as to economic and educational steps which might be taken to improve their lot.

The chapter on the Chenchus of Madras Presidency gives a valuable insight into the effects of certain administrative measures. While still relying to a large extent upon jungle produce, these Chenchus have taken to cattle-breeding, paid labour, and, to a lesser degree and reluctantly, to agriculture. Government policy seems to have been progressive, especially in the fields of education and the development of cooperative societies. But Fürer-Haimendorf has some valuable constructive criticisms to offer, particularly of the official policy of establishing larger settlements. Again, the practice of appointing headmen from alien agricultural communities, with the laudable object of teaching the Chenchus agriculture, "is likely to have a disintegrating effect on the Chenchus' already crumbling social order" (p. 314). Their social maladjustment, he thinks, is reflected in the surprisingly high number of serious crimes. He has some astute comments to offer on the relation of some of these crimes to settled existence in larger communities, which is not suited to Chenchu habits.

In his last chapter the author reviews the prospects for the future of the

jungle Chenchus, and offers concrete suggestions. He rightly repudiates the suggestion that anthropologists wish to keep primitive tribes as an "anthropological zoo." But he considers that the Chenchus should, for the present, be encouraged to continue their semi-nomadic jungle life. The raising of their standard of living should be effected through cattle-breeding, employment as forest guards or watchmen, and the introduction of crops—taro, yams, and other vegetables—appropriate to their casual methods of cultivation with the digging stick. All these activities are congenial to the temperament and aptitudes of the Chenchus, who do not readily take to plough cultivation and the settled life of agriculturalists. The author advocates the creation of a reserve for the jungle Chenchus, with a clarification of their rights to jungle produce. It is heartening to note (Appendix VIII), and a just tribute to Baron von Fürer-Haimendorf's work, that the Hyderabad Government has already acted on this and other of his valuable suggestions.

The Reddis, dealt with in the second volume, live in the hills of the extreme eastern tip of Hyderabad State and extend over its borders. They have an elaborate ecology which includes hunting and food-collecting, shifting cultivation with the digging stick and hoe, settled agriculture with the plough, fishing, and gardening. Cattle are kept primarily as draught animals; their milk forms a small part of the Reddi diet, but the eating of their flesh is forbidden, though this is not the case with goats, pigs, and fowls.

The various types of food-getting activity, which vary from one group of Reddis to another, are admirably described. Some of their social implications are indicated, for example, in the field of land tenure. Under shifting cultivation the (usually plentiful) forest land is owned by the village community. A man may clear any patch of unoccupied jungle and cultivate it until he chooses to move elsewhere. On the other hand, settled agriculture with the plough on the more fertile flat lands is associated with permanent ownership, inheritance, and alienation by individuals. We might be tempted to contrast these systems as "communal" and "individual" respectively, but the author points out (p. 94) that, in terms of Reddi conceptions of land tenure, there is less difference than might be supposed. Except in regard to alienation and its socio-economic implications, the only difference is that under shifting cultivation the individual in fact chooses to surrender his land rights from time to time, though they are indisputably his for as long as he chooses to exercise them.

The chapter on food consumption is also valuable. The place of food in social, ceremonial, and religious life is stressed, though there is a lack of precision in definition. The treatment of social organization is more adequate than in 'The Chenchus,' though here again there appears to be some distortion as a result of historical assumptions. Thus there is an interesting contrast in systems of authority between the northern "villages" which consist of scattered hamlets or households, and the larger and more compact village units of the Godavari region. In the former the headman also acts as priest, the office being hereditary. In the latter there is a tendency towards differentiation of the two functions. The office of priest is still hereditary, but if the incumbent is unimpressive or incompetent the secular title of headman may be vested in someone who "speaks well." The relation of this system to social and political conditions is well described. But the assumption (probably correct) that the system of the northern Reddis was the "original" leads to a somewhat cursory treatment of authority among these groups.

Later chapters are devoted to a contrast between the economic position of the northern groups practising shifting cultivation and living in relative isolation, and that of the Godavari Reddis who use the plough and indulge extensively in

paid labour for timber merchants. The effects of outside contacts on the latter group are admirably described. The evils of indebtedness, land alienation, and extortion by subordinate officials are suffered by the Reddis in common with other primitive Indian tribes. But the devious forms of exploitation by timber merchants provide a novel and revealing narrative. Prior to Baron von Fürer-Haimendorf's visit, these merchants had acquired an absolute domination, economic and psychological, over certain Reddi communities. They were able to obstruct the early phases of his work by preventing Reddi informants from cooperating with him, fearing any inquiries which might reveal the nature of their activities. Their fears were justified. As a result of his report, Government orders were issued curbing their extortions and also making more land available for shifting cultivation. On the latter point, the authors agree with Verrier Elwin that its evils can be greatly exaggerated, while attempts at its curtailment are fraught with grave dangers. Experiments in the development of cooperative societies are also described and valuable comments offered on the possible effects of changes in the administrative, educational, and religious fields.

In spite of their defects from the point of view of scientific ethnography, both of these volumes are valuable contributions to the study of the socio-economic adaptation of primitive Indian tribes and of the effects on their welfare of alien contacts. Both are admirably illustrated. And both show the practical value of collaboration between a sympathetic scientific observer on the spot and a co-operative administration. Particularly in view of the obstacles which they had to overcome—the difficulties and dangers of ill-health as well as the magnitude and complexity of the ethnographic task—the two investigators (the author was assisted by his wife) are to be congratulated on a contribution valuable alike to science and to the promotion of human welfare. RALPH PIDDINGTON.

REVIEWS

EUROPE

ENGLISH COUNTY: a planning survey of Herefordshire. (A Publication of the West Midland Group on Post-War Reconstruction and Planning.) *London: Faber and Faber*, 1946. 11½×9 *inches; 266 pages; maps, diagrams, and illustrations.* 21*s*

The West Midland Planning Group, which came into being in 1941 under the Chairmanship of Dr. R. E. Priestley, is to be congratulated on this comprehensive study of the Herefordshire scene. It is on surveys of this type that planning for the future should be based, and after reading it one feels how important it is that experienced geographers (schoolmasters as well as university lecturers) who know a region well through personal contact should be members of planning committees in an advisory capacity. The report is divided into five main sections: the Land, the People, Industry, Agriculture, and Social Environment and Public Services. Of the six appendices, the last gives an outline Grassland Survey of the county. A prominent feature of the book is the outstanding series of maps, together with many carefully chosen photographs.

The first section emphasizes the importance of the physical environment in controlling man's activities. It could have been a little more detailed. It is here that the most original maps occur, but the indices to the maps on pp. 51–3 should have been fuller. The Landscape Survey Zones should have been explained on the map, and the same applies to the "pointing system" on the map of the Land Use Zones. The geological map (p. 49) uses colours which, though striking, are not the familiar ones used on Geological Survey maps; the extent of the Pleistocene deposits should have been shown.

The study of population is based on the 1931 Census and earlier records, but the subsequent trends are dealt with in the section on Industry, where the field for possible industrial development is shown to be very limited.

The chief interest in the report lies in the account of the state of agriculture in the county and the recommendations for raising it to a higher standard. One or two disturbing features are noted. One is that the quality of the permanent grasslands is not what it might be. "In pre-war days the preponderance of poor quality permanent grasslands, far more than any other factor, prevented the county from making its optimum contribution to the agricultural output of the region and the country." Another is that, although there are a number of young and highly productive commercial apple orchards (p. 127), "the bulk of the apple acreage is to-day composed of old unthrifty orchards whose contribution to the farm income is negligible. The situation is particularly grave in respect of cider apples which make up some 60 per cent. of the total fruit acreage and which constitute the basis of one of the county's major industries."

Herefordshire is justly proud of its beef cattle and everything should be done to preserve the purity of the breed. An original idea was to reproduce (p. 110) a page from the American magazine *Life* about a ranch south of Oklahoma City, an area called "Hereford Heaven" by the cattlemen.

About 22 per cent. of the hop acreage of England and Wales is in Herefordshire, concentrated in the triangle formed by Hereford, Bromyard, and Ledbury (map, p. 122). South Wales and the Black Country provide most of the seasonal labour, the housing of which is considered a "social problem of the first magnitude." There has been a decline in recent years in the small-fruit acreage

and the report thinks that its future would appear "to be bound up with the future of the canning and jam-making industry in the county." Geographers will find the numerous distribution maps in the agriculture section most valuable.

The section on Social Environment and Public Services is the longest in the book, but is not everywhere easy to read since the reader is often asked to refer to some tabular statement. A survey of housing is given first, and a point of interest is the series of coloured maps classifying houses in Hereford and the market towns. Among the Public Services an urgent matter is piped water supply (map, p. 164), and a scheme using river intakes is outlined and illustrated on a map (p. 166). Another map (p. 169) shows the very restricted areas supplied by gas; the map on p. 171 shows the very much better position of electricity under the National Grid System.

To broaden the basis of rural life and to give extended amenities, it is suggested that parishes should be grouped with a focal village as the centre of the community (p. 201). Incidentally there is no key map of the parishes, although many references to parishes are made throughout the book. In the section on Education is an outline of the far-reaching scheme of reorganization that the County Authority hopes to develop. This includes closing down many small village schools and conveying the children to larger centralized schools of about one hundred to one hundred and fifty pupils. It will be interesting to learn the reaction to this.

There are only minor criticisms to make. Many of the maps are without a scale of miles. Surely the town maps on pp. 153–9 and 193–200 should have included a scale. Were the maps in the latter group meant to be self-explanatory, as there appears to be no text reference to them? A quarter-inch physical map of Herefordshire is included as a front end-paper; it should have been made to unfold out of the book so that it could be referred to easily. The large amount of valuable information in the book makes it of great interest to geographers, and copies should be not only in university libraries but in the reference libraries of schools.

J. M.

GÉOGRAPHIE UNIVERSELLE DES TRANSPORTS. Tome I, Géographie des chemins de fer français. 1^e^ vol., La S.N.C.F. By H. LARTILLEUX. *Paris: Librairie Chaix*, 1946. 11½×8 *inches;* 338 *pages; maps, sketch-maps, and illustrations.* £3 5*s*

This is the first volume of what promises to be a monumental work which, if it be carried through according to plan, may well approach the dimensions and importance of Reclus' 'Géographie universelle.' Briefly, the intention is to provide "an accurate illustrated presentation of the transport lines at present in service"; the whole world is to be covered and all forms of transport—railways of all kinds, tramways and trolleybuses, roads and road vehicles, river and canal transport, ocean shipping, airways, and even telecommunications. It is indeed a colossal undertaking and there is nothing in the first volume to indicate that it is to be anything but the work of one man.

The *raison d'être* of the whole scheme is admirable. No one, says the author, has ever essayed the complete geographical description of transport lines. Textbooks and studies in economic geography commonly mention the main lines but never describe the whole network in all its detail with the precise significance of every section and branch. The author's claim is substantially true. The reviewer can recall a few attempts at geographical description, some technical, some popular: perhaps the most noteworthy is the fine volume produced in the early 'thirties by the Czechoslovak State Railways; but nothing quite like the present volume has ever appeared before. So the main function of the work will be

geographical description, in broad outline and by detailed itineraries. For the fuller understanding of these descriptions, an historical outline will precede each with a brief account of such technical features (in the case of railways) as signalling, rolling stock, marshalling yards, important engineering works, and so on. The raw material for such descriptions must be gathered from a wide variety of sources, such as engineering and transport periodicals, supplemented by study of large-scale maps and by close personal acquaintance with the routes to be described.

The first two volumes in the series are to be devoted to France. The first, the subject of this review, describes the lines of the National Railways (S.N.C.F.); the second will deal with the secondary lines, the "Métro," urban and suburban tramways, trolleybuses, funiculars, etc. A third volume will deal with the railways of French North Africa and the French colonial empire and with other French-owned railways, *e.g.* in Ethiopia.

This first volume is a magnificent production, finely printed on thick art paper and heavily bound. Its author is exceptionally well qualified for his task, having been chief inspector to the S.N.C.F. After a brief historical introduction to show how the railway network developed, it plunges into the detailed description of the various lines, starting with the main line of the old P.L.M. and working round anticlockwise through the Alpine region, the Eastern and Northern regions, the West (former État system), the South-West (P.O.-Midi), and the lines of the Central Massif. Each of the former main-line companies which existed before the formation of the S.N.C.F. in 1938 has its brief historical outline and an illustrated account of the growth of its Paris terminal. Each main line is described in turn in some detail; every important station *en route* is mentioned with brief references to the nature of the terrain traversed, the principal engineering works, and the destination and function of all the branches. Then each major branch is similarly treated. Special attention is paid to the electrified lines and their sources of power (mostly hydro-electric). Reference is made in the text and in some of the illustrations to the damage suffered during the recent war and to the progress of reconstruction.

The illustrations are an essential part of the work. A finely printed coloured map on a scale of 1 : 1·5M, showing layered relief and all railways with every terminus and almost every junction named, is divided into nine sections appropriately distributed through the volume. There are nearly 250 text figures, mostly beautifully clear sketch-maps to scales of between 1 : 75,000 and 1 : 150,000 of individual towns and regions of complex rail-net, with gradient profiles of most of the main lines and occasional diagrams of important viaducts, bridges, marshalling yards, station lay-outs, etc. A special word of praise is due for the clarity and detail of these sketch-maps. Most of them make some attempt to show the physical nature of the terrain by hachures or contours, as well as the precise lay-out and classification of all the railway and tramway lines. An important feature is the accurate and precise portrayal of all junctions (how often do atlases and text-books come to grief over this!) with the "fly-overs" which are so common in France, and of all marshalling yards. The maps of the major industrial areas are especially valuable since they show all the colliery and industrial lines, mines, and major iron and steel works.

Finally there are several hundred well-chosen photographs, each one strictly relevant to the text and of direct railway interest; it is of course characteristic of the French landscape that many of them are also beautiful pictures, including some really superb views of viaducts and railway scenes in the Alps and Central Massif.

As a purely descriptive work the volume cannot be said to contribute much

to the methodology of transport geography; but it remains an invaluable source-book on the geography of the French railways and, incidentally, a magnificent piece of military "intelligence." The reviewer would conclude by lamenting that it was not available in 1941. S. H. B.

GÉOGRAPHIE UNIVERSELLE. Tome VI, la France. 2me Partie, France économique et humaine, I. By A. DEMANGEON. *Paris: Armand Colin*, 1946. 11 × 7½ *inches; 460 pages; maps, diagrams, and illustrations*

This is the penultimate volume in the well-known series, 'Géographie Universelle,' which began in 1927 with Demangeon's 'Iles Britanniques.' The second part of the work under review will bring the total to 23 volumes, of which three will deal with France, a natural proportion in a series which is an outstanding achievement of modern French geography.

The manuscript of the present work was completed shortly before the author's death in 1940 and it was seen through the press by M. Perpillou. No attempt was made to revise the text, so that it describes conditions in 1939 and forms the basis from which a solution of present problems must proceed. Demangeon's standing among geographers does not require to be elaborated. 'France économique et humaine' is the consummation of a lifetime of research, embodying the characteristic approach and methods of the French school, particularly in the careful balancing of historical and social against environmental influences in the interpretation of the cultural landscape; the appreciation of local variations within the wider regional or social framework; and a broad and undogmatic outlook. If his earlier work had a definitely historical bent, he does not go as far as Brunhes in viewing human geography as the "introduction normale à l'histoire" but aims at displaying the "alliage subtil" between nature and human effort which has contributed to the evolution of modern France.

Without the second volume, the scope of which is not indicated, it is impossible to pronounce definitely on the arrangement of the matter and any criticism must therefore be provisional. The difficulty has clearly been the amount of material to be digested and assessed. This volume is divided into four parts: after a general introduction, "Figure et personnalité de la France," in the line of essays by Reclus, Vidal de la Blache, and Brunhes, the first part deals with France in Europe and the World, including a discussion of the vital statistics of the population, external commerce, the colonial empire, and air lines. The fourth part deals with internal communications, leaving ocean routes to be dealt with later, presumably in connection with ports.

The second and third parts are the substance of the volume. In part three the author deals with agricultural economy and rural life, and includes in this a summing-up of a branch of inquiry which he largely inspired and directed, the problem of the "habitat rural." He shows that in France, small hamlets are as ancient as larger concentrations of population. They are sometimes occasioned by the limited extent of arable in mountainous or broken topography or by a pastoral regime in unsettled regions, while the three-field system and extreme subdivision of holdings are associated with concentrated settlement. Isolated dwellings are characteristically a secondary form, related to more recent reclamation or re-peopling of a district and, in late years, to advances in the economic status of the peasantry. He also deals here with the distribution of types of farm buildings, the farm being considered as an expression of rural activity. As in the case of settlement, the historical and social influences appear to be as strong as the geographical.

For his study of French agriculture, in part four, Demangeon divides the country into seven great regions, based broadly upon climate and relief but also

taking into account the characteristic type of exploitation, for example, intensive arable farming in the North and the Paris basin, stock-raising based on crops in the West, pastoralism in the Massif Central. These broadly drawn regions comprise an infinity of local variations, arising from the topography, soils, and stages of economic development. Except in outstanding instances, these minor regions can only be briefly indicated. In the North, for example, there is the contrast between the small-scale intensive cultivation in Flanders, the large farms on the *limon*, the animal husbandry of Bray, and the varied cultures of the valleys and *coteaux*. However, to have broken down these large regions systematically into smaller units would have necessitated the description of a multitude of *pays*. In France, where agriculture employs so large a proportion of the working population, the small towns, with their markets, fairs, and rural industries, play a proportionately important rôle in national life, and it is intelligible therefore that each regional description should conclude with a section on the sites, history, and functions of these centres, the characteristics of each being indicated in a few compact phrases. Though this arrangement is understandable, the reader is conscious of the void created by deferring the treatment of the great cities to the next volume.

In general, to obtain a comprehensive view of the life of a particular area, a good deal of reference from one chapter to another is unavoidable, but all the necessary material is provided. The clear and easy style of the writing is notable; there are excellent illustrations and detailed bibliographical references. An examination of the latter makes very plain the great contribution over the last fifty years of the *Annales de Géographie* to the geography of France. It is difficult to believe that Demangeon's work is likely to be superseded for a considerable time. G. R. C.

SOVIET LANDS: the country, its people and their work. By G. D. B. GRAY. *London: A. and C. Black*, 1947. 8×6 *inches;* viii+324 *pages; sketch-maps, diagrams, and illustrations.* 12*s* 6*d*

L'U.R.S.S.: la terre et les hommes. By GEORGES JORRÉ. (Géographie du monde, No. 1.) *Paris: Soc. d'éditions françaises et internationales*, 1946. 8½×5½ *inches;* xviii+403 *pages; maps and illustrations.* £1 2*s*

GÉOGRAPHIE PHYSIQUE ET ÉCONOMIQUE DE L'U.R.S.S. By ALFRED FICHELLE. *Paris: Payot*, 1946. 9×5½ *inches;* 223 *pages; sketch-maps.* 12*s* 6*d*

U.R.S.S.: Haute-Asie–Iran. By PIERRE GEORGE. *Paris: Presses universitaires de France*, 1947. 9×7½ *inches;* xvi+534 *pages; sketch-maps, diagrams, and illustrations.* 650*fr.*

LA SIBERIE: la vie en Siberie, les temps anciens. By KAI DONNER. Translated from the Finnish by LÉON FROMAN. *Paris: Gallimard*, 1946. 9×5½ *inches;* 246 *pages; maps and illustrations.* 205*fr.*

The late war evoked a renewed and sharpened interest in the Soviet Union which is sustained by the unsteady course of post-war peace-making. We are mindful of the daring generalizations of the late Sir Halford Mackinder with reference to the "Heartland" and World Power which in themselves, since they have still an uncanny relevance to the international problems of our time, direct attention to the U.S.S.R. and justify the preparation of such introductory geographies as the first four books listed above. That these studies are no more than introductory, marking out the broad lines of Soviet physical and human geography, can be shown arithmetically. If we bear in mind the comparable areas and populations of the U.S.S.R. and the United Kingdom, the space allotted to the U.S.S.R. by these four books is equivalent to between 3 and 5½

pages (on the basis of area) and 50 and 100 pages (on the basis of population) to the United Kingdom.

Mr. Gray's 'Soviet lands' can be confidently recommended as a readable, competent, and up-to-date introduction to the physical and human geography of the U.S.S.R. An experienced teacher, the author is at pains to demonstrate some of the general principles of geography of which the Soviet lands provide particular illustrations. He attempts too to measure the U.S.S.R.'s production comparatively as well as regionally, and exhibits a flair for illustrating his text by drawings, sketch-maps, and diagrams. Indeed the distinctive merit of this book is that it imparts at one and the same time many of the elements of systematic geography and a lot of widely ranging information essential to any balanced understanding of the U.S.S.R. Mr. Gray's "Heartland" (*v.* Figs. 51 and 52) is Mackinder's Heartland much reduced, which suggests that geographers might be either more wary or consistent in the use of such terms. Fig. 104, showing the distribution of blast furnaces, is over-generalized and should not be regarded as showing the distribution of pig-iron production. Chapter V says less than enough about the nature of Soviet Government; for example, the place of the Party and its Politburo cannot be ignored. The contribution of coal from Karaganda to the Urals (*cp.* Fig. 105), now important, deserves notice. On the other hand, there are valuable and fresh sketches (*e.g.* those of railway facilities in Figs. 120 and 121), sections (*e.g.* that of a typical oilfield in Fig. 98), and physiographic diagrams in Chapter II. 'Soviet lands' should prove educative and useful, not least in our schools.

Jorré's 'L'U.R.S.S.,' which appears in the Géographie du Monde series under the editorship of Professor Perpillou of Lille, is a substantial contribution and provides a balanced and readable introduction. Unlike Fichelle's book, it contains photographs (some of which are unfamiliar), graphs, folding maps, a useful bibliography, and an index of geographical names. There are sections on the historical process of settlement (including house types) and on the development of Russian-Soviet economy. Nearly half of the book is devoted to the natural regions of the U.S.S.R.—Tundra lands, Forest lands, Black Earth lands, and others. The statistical framework of the book is sound and, like Fichelle, Jorré makes use of the latest census (1939). A few slips or oddities may be noticed. Why, for instance, were not the latest (1939) official figures used for the maps of towns (Figs. 11 and 12)? The grain production figures are very "gross" and susceptible to reduction by about 20 per cent. to give barn yields. The two conflicting figures for cotton production cited on p. 166—2·5 and 0·8 million tons—are both correct, the former referring to "raw," the latter to "ginned" cotton. "Milliard kwh" on the graph in Fig. 20 should read "million kwh"; and 50,000 tons of rubber as the likely output from the cultivation of *kok-sagiz* (a variety of dandelion) in 1940 is wildly optimistic (p. 164).

Fichelle, whose background includes academic experience at Leningrad and a knowledge of Russian, briefly reviews the physical, regional, and economic geography of the U.S.S.R. with the aid of twenty-one sketch-maps and relevant statistics. His slim volume is broadly complementary to that of Jorré, particularly since he provides thumb-nail sketches of the major economic regions of the Union. His thirteen regions, which accord with Soviet ideas, are independent of administrative divisions and are delimited boldly (indeed geometrically) on his sketch-maps which take into account the new western limits of the Union. An occasional error in the figures or a misleading impression may be noticed. Western Siberia is wholly within R.S.F.S.R. (p. 128); the great hydro-electric project at Lake Sevan (Armenia S.S.R.) was still a project in 1940 and is doubtless so to-day; the figures for the total sown area for the year

1938 given on p. 170 should read 338 and 392 million *acres*. Fichelle's figure for exploitable oil reserves of the U.S.S.R.—5500 million tons—although it may not be far wrong, differs from the official figures given in the 3rd Five Year Plan, namely 997 million tons prospected and ready for exploitation (barely enough to last thirty years) and 8690 million tons of "geological reserves"—possibly a poetic figure. The fall of Baku oil output noted by Fichelle (p. 175), from 24 million tons in 1941 to 17·5 millions in 1943, after the Germans had cut the Volga waterway, is an interesting point and probably more accurate than his suggestion elsewhere (p. 104) that this field increased its output during the war. It is an over-simplification to call Krasnoyarsk "an immense plain" when it is its southern elevated part which dominates its human geography.

'U.R.S.S.' by Pierre George is a substantial contribution to the "Orbis" series of introductory geographies edited by André Cholley. It is well documented and presents a broad and balanced survey. Unlike the other studies here noticed this work includes chapters dealing briefly with Sinkiang, Afghanistan, and Persia. Particular attention is given to the physical background of the U.S.S.R. and to the Soviet Arctic. Another special feature is a review of Soviet economy as it suffered from and reacted to the impact of the recent war. The discussion of the 4th Five Year Plan (1946–50) on pages 423–432 is revealing; for example, the modest target for oil production—35·4 million tons in 1950, which approximates to the pre-war level. It is surprising to note that the Donbas had reached half its pre-war output by the end of 1945 and it is difficult to believe that electric power capacity was then nearly twice that of 1938 (pp. 318 and 422). A small point: Fig. 49 (p. 440) surely gives too restricted a frame to the Donetz coalfield, showing Shakhti, one of the chief mining centres, rather remote from it.

In 'La Sibérie' the late Kai Donner, Finnish scholar and traveller, looks behind the now rapidly changing Siberian scene and attempts to explore the origins and development of the Siberian peoples and their culture. He brings under brief review geology and geography as well as linguistic, anthropological, archaeological, and historical evidence and is specially concerned with western Siberia; but it must be admitted that he is defining rather than answering questions and that much which we should like to know about the origins, movements, and inter-relationships of the distinguishable ethnic and linguistic groups of Siberia remains obscure. The book sketches the Russian penetration and conquest, and has much to say about the problems connected with reindeer breeding and hunting in the Far North. W. G. E.

THE POPULATION OF THE SOVIET UNION: history and prospects. By FRANK LORIMER. *Geneva: League of Nations*, 1946. 11×8 *inches;* xiv+289 *pages; maps.* 17*s* 6*d*

Dr. Frank Lorimer's book is one of a series already published or promised by Princeton University's Office of Population Research and was prepared for the League of Nations as part of the essential background material for international studies. Lavishly produced, it incorporates many of the population maps from the Soviet Atlas and an impressive series of diagrams drawn by the staff of the American Geographical Society. There is a bibliography of more than five hundred entries, many pages of statistics, and every sign of the cooperation of research assistants, statisticians, and draughtsmen over whom the author has presided. Dr. Lorimer has had to collate and synthesize the population figures of an area of continental proportions, make his forecast of the demographic trends, and show where and how the population of the Soviet Union live. The dangers lie in the de-humanization through masses of statistics and in a type of

mapping which, tied to administrative areas, obscures the actual distribution of the people: hardly less significant, many of the forecasts of demographic trends may be futile. All these dangers have been avoided to some extent, partly because the maps, while using political boundaries, show the "principal populated areas" by a light stipple.

The historical approach is of particular value in all population studies. Under the Russian Empire only one complete census was taken, in 1897. Prior to this information was sketchy though apparently Russia shared with many other countries a sharp rise of population during the eighteenth century. There were movements from the forests of central and north Russia into the black earth belt and steppes of the south but by the middle of the nineteenth century most of the best land in the south was occupied. The population continued to increase to the end of the century and the eastward movement into the Siberian and Asiatic steppes began. In 1897 therefore, the distribution of population in European Russia was the expression of an agrarian economy, that in Siberia of a pioneering stage. Russia appeared to be over-populated and probably was, for the people were culturally retarded, poverty-stricken, and acutely conscious of "land hunger." In reality Russia was a land of great potentialities. In 1897 few of its 106,000,000 inhabitants dreamed of the great industrial expansion that was to come some thirty years later. Even in 1926 only 18 per cent. of the population lived in towns, yet the urban population doubled between 1926 and 1939. In effect, the Soviet Union is a new country comparable with America or Australia though with so different a background, and the agricultural expansion of the eighteenth and nineteenth centuries has been followed by an industrial renaissance in which fuel and mineral resources are being more adequately used than ever before, transport is being reorganized on modern lines, and the towns are growing steadily. There is a prospect that the population, now approximately 169,000,000, will increase to at least 200,000,000 by 1960 and by a further 10 per cent. in the decade 1960–70. The birthrate however already shows signs of declining in the towns, where it is around 28 per 1000 against 45 in the rural areas. At the same time the death rates, including those of infants, are also declining so that the natural increase will remain high.

It is clear that the Soviet Union possesses industrial and agricultural potentialities which effective organization, at once centralized and regional, can develop in such a way that everyone will be assured of an adequate living. The separate republics within the Union have their own national groups, their own economic and social problems, but their joint resources are enormous, given integrated organization from Moscow. One welcomes Dr. Lorimer's work as a full discussion of the human resources of the Union: but statistics alone are not enough, even when treated as intelligently as they are in this book. The great need is for more and more regional studies of this great heartland of the Old World, in which the people will appear as they live day by day on the collective farms or the new factories, in the forests of Siberia, or on the irrigated river lowland of Turkestan.

T. W. F.

HELLENIC TRAVEL: a guide. By W. A. WIGRAM. *London: Faber and Faber*, 1947. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 266 *pages; maps, plans, and illustrations.* 15*s*

This book rouses a host of pleasant memories and should be useful to all travellers to Greece when that unhappy country is again open to tourists. Dr. Wigram writes mainly for the cruising tourist, but he knows the country and the people well and many readers will welcome his excursions into less familiar districts, for Greek scenery has a perpetual charm and the people will, it is hoped, still be found to preserve their native simplicity and kindliness. Since

the introduction of motor roads the amazing complexities of Greek travel have diminished, but here and there mules may still be necessary and the wise traveller will go where he can afoot. But Athens, Corinth, Mycenae, Olympia, and Delphi are magic names and the tourist who sees no more of Greece will have much to think about.

It is impossible to describe one's first impressions of the Acropolis at Athens and Dr. Wigram wisely makes no attempt to do so. He fills in the background without being technical or too learned and leaves the rest to the individual. There is an excellent chapter on Eleusis and the Mysteries. The temples at Sunium and Aegina are described and excellent photographs are provided for the benefit of tourists who cannot visit them. Crete has a chapter to itself and the book ends—rather surprisingly—with a description of Constantinople. One could wish for a better map and a clearer plan of the Acropolis but, as Dr. Wigram implies, the difficulties of book production are at present endless. His brief references to medieval Greece are very welcome. But why bring in Sir John Mandeville, who does not describe the Greek mainland or mention Athens? M. L.

ASIA

SYRIA: an historical appreciation. By ROBIN FEDDEN. *London: Robert Hale,* 1946. 9×6 *inches;* 287 *pages; end-paper maps and illustrations.* 21*s*

This is not a documentary collection of facts but the travel-book of a discerning observer who is also a scholarly historian. To Mr. Fedden Syria is pre-eminently a land of historical memories and, sensitive to the links between the present and the past, he has travelled widely in search of ancient sites. His description of the monuments and of the modern scene is interspersed with a sketch of Syrian history throughout the ages. The keynote of this history is the part played by Syria as the meeting-place of the East and the West and the impact on its soil and its people of alien civilizations. Hellenistic temples, Byzantine churches, and Crusader castles remain to show the varied influences which have come from the West, while a native civilization springing from the Syrian soil is revealed in the desert palaces of Umayyad princes under whom Syria for a short time came wholly into her own as the centre of a world-power. Turning to the contemporary scene, Mr. Fedden notes with nostalgic regret that the latest invasions have produced no buildings calculated to give pleasure either to the present or to the future. Archaeologists of the future will say that the period of the "Blue Gillette" has left few remains of artistic importance on Syrian soil. The French administration however receives judicious though not unqualified praise. "The objective observer will probably come to the conclusion that, if there were omissions, there were also important achievements, and that by and large the country profited very considerably from the period of mandatory rule."

Mr. Fedden combines scholarship with a gift for lucid writing and his descriptions of landscape and architecture reach a high level of excellence. Though not erudite in the technical sense, his book will be read with profit by the specialist as well as the serious-minded general reader.

It is a pity, in a work of this quality, that little care has been bestowed on the spelling of Arabic names (Fakr ed-din and Mouy ed-din are regrettable examples) and that misprints such as "Nazianus" (for Nazianzenus), "Septimus Severus," "Heracleus," and "Yarmak" have been left uncorrected. There is no warrant for the statement that Bath-Zabbai, the Aramaic form of Zenobia's name, means "daughter of a merchant," and the traditional ascription of the "Treatise on the Sublime" to Longinus, the friend and adviser of Zenobia, is rejected by most scholars. S. H.

THE WESTMINSTER HISTORICAL ATLAS OF THE BIBLE. Edited by GEORGE ERNEST WRIGHT and FLOYD VIVIAN FILSON with an introductory article by WILLIAM FOXWELL ALBRIGHT. *London: S.C.M. Press*, 1946. 16 × 11 *inches*

This most commendable work will be especially welcomed by all who are interested in the Bible, Bible times, and Bible lands. It holds eighteen plates containing thirty-three beautifully drawn and delicately colour-printed maps, presenting the most recent knowledge about the various periods from the time of the Patriarchs to the early expansion of Christianity. The plates are half-tone engravings of hand-drawn maps, showing relief by fine hill-shading with topography overprinted in black and colour. The result is clear, effective, and attractive.

An introductory article by W. F. Albright explains how the biblical world has been rediscovered by modern scholars. The archaeologists from Britain and elsewhere in Europe have been increasingly reinforced by the well-founded American school. Their work has been supported by scholars in related fields, especially the translators of long-lost literature, manuscripts, and inscriptions. As a result much light has been shed on ancient history and topography and numerous sites hitherto unknown, uncertain, or wrongly attributed have been definitely located, dated, and identified.

The fruits of these laborious researches are presented by the authors in a series of chapters relating to the coloured plates. They give the general background of each subject or period, duly stressing the geography which has played so large a part in determining Bible history. Each chapter is plentifully illustrated by photographs of topographic features, documentary evidence, and vivid restorations. The whole forms a scholarly and very readable geographical commentary on the Bible. The textual cross references to Bible passages are helpful to the student, as are the indexes to the text and to the maps. The latter includes a complete topographical concordance of all places mentioned in the Bible. E. C. W.

FAR RIDGES : a record of travel in north-eastern Burma. By J. K. STANFORD. *London: C. and J. Temple*, 1947. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches; 208 pages; end-paper maps and illustrations. 16s*

Mr. J. K. Stanford was a Civil Servant in Burma for seventeen years after the first world war. The country fascinated him, especially its birds. He snatched hours of leisure from the routine duties of a Deputy Commissioner in Myitkyina to pursue his chosen hobby of bird collecting, with such success that his 'The birds of northern Burma' is a standard book for naturalists in that region. In 1938, after two years in England had made him yearn for the haunts of his active life, he accepted with enthusiasm an invitation to join a scientific collecting expedition among the wild mountains on the fringe of which he had spent his last years of service. Suydam Cutting, Arthur Vernay, and Harold Anthony from America, Mr. Kingdon Ward, and Mr. Stanford set out from Myitkyina in October 1938 and for five months travelled in the "triangle" between the Nmai-Kha and the Chaungmaw. Mr. Stanford recounts their day-to-day experiences in 'Far ridges.'

Life, even in retirement, has been too urgent for Mr. Stanford to cultivate the art of delicate expression; but the reader who is interested in ornithology will find much pleasure in the undisguised enthusiasm of his narrative. It would be easy to criticize the disjointed nature of his story and the small space he gives to the important work of Mr. Kingdon Ward, but birds are Mr. Stanford's main interest and he had naturally more in common with the activities of Mr. Arthur Vernay and Mr. Suydam Cutting, the prime movers of the expedition.

Like most men who enjoy collecting rare species, Mr. Stanford has a profound contempt for the men who claim record bags in the more conventional shoots; but when one reads his "partly statistical" penultimate chapter it is hard to see any great difference in viewpoint between the sportsman who shoots birds to gain a record bag and the field naturalist who shoots birds to gain the record of a new species. But it is not the descriptions of bird collecting which leave the deepest impression as one finishes this book. Its outstanding feature is the portrayal, often unconscious, of the writer himself, of his enjoyments and his prejudices, above all of his enthusiasm for the wild Burma hills.

An unfortunate wrapper and mediocre illustrations detract from the merits of the book but an excellent map is provided on the end papers. R. S. R.

LE MONDE MALAISE. By CHARLES ROBEQUAIN. *Paris: Payot*, 1946. 9×5½ *inches; 510 pages; maps, diagrams, and illustrations*

Professor Robequain has followed his study of Indo-China with another, longer but less profound, of the peninsulas and islands which lie between Indo-China and Australia. By a considerable stretch the "Malayan World" is made to embrace Timor, the Moluccas, and the Philippine Islands. The focus of the book, if it can be said to have one, is Java rather than Malaya.

The author describes how, in the summer of 1938, he visited the countries he describes in company with "very competent guides." If anything the guides appear to have been a little too competent; their complacency is all too clear. The author was overwhelmed by the civilizing achievement of the white peoples, "l'une des plus belles réussités de la colonisation blanche." He saw little amiss in the colonial empires of three nations and his book reads a little oddly now. Independence movements are dismissed as the aspirations of a "small minority of intellectuals."

Nevertheless, the book has considerable merits. The geographical introduction is good. The examination of the volcanoes of the Indies is interesting and the author's judgment—"the benefits which volcanoes have brought with them far outweigh the damage they have caused"—suggestive. Earthquakes receive little mention but perhaps there was none in the summer of 1938. Throughout the book, the descriptions of the physical scene are interesting and colourful. The book's fault lies in the fact that it is the record and the recollections of a rather hasty tour. Too many problems are raised and left in the air; too many issues are avoided. Much more requires to be said on the question of peasant proprietors and plantations, on the control schemes in tin, rubber, and sugar and on the reaction of the peasants to them.

The treatment is regional in that each island or island group is considered separately and that regions are roughly defined in each. The writer describes the distribution of crops, relates them to soil and climate, and sketches the history of their cultivation. The density of population receives ample consideration but the accounts of rural and urban settlements are purely descriptive. The book is eminently readable and is illustrated by excellent sketch-maps and mediocre photographs. N. J. G. P.

THE CRUEL WAY. By ELLA K. MAILLART. *London: William Heinemann*, 1947. 8½×5½ *inches; 218 pages; end-paper maps and illustrations.* 18*s*

This book is a somewhat surprising change from Miss Maillart's reticent and realistic account of her adventurous journey across Central Asia, 'Forbidden journey.' It is largely concerned with her intimate relations with her companion and her sympathy for her sufferings. The account of the main road from Herat to Kabul is somewhat more objective than the rest of the book, but it is marred

throughout by inconsequences of spelling of place- and personal names, and the intimacy of the theme constantly intrudes. The photographs are excellent. Those of Bayazit are very welcome, for the site is of great importance.

K. DE B. C.

AFRICA

AFRIQUE OCCIDENTALE ET CENTRALE. Carte de l'élevage. Dressé par F. BONNET-DUPEYRON. 6 sheets (1. Éleveurs, Transhumance, Nomadisme; 2 and 3. Densité, Répartition du Cheptel; 4. Viande consommable de la population; 5. Commerce du bétail; 6. Principales zônes et régions d'élevage). 1/5M.

AFRIQUE OCCIDENTALE ET CENTRALE. Densité de population. Dressé par F. BONNET-DUPEYRON. 1/5M.

CARTE ETHNIQUE DU GABON. Dressé par MLLE. Y. THIERY et R. DELAROZIÈRE. 1/1M.

Paris: Office de la Recherche Scientifique Coloniale, 1945

The Office de la Recherche Scientifique Coloniale (Bureau d'Études Humaines) of the French Ministère des Colonies has sent the Society a number of maps dealing with aspects of the geography of West and Equatorial Africa. Six of them are concerned with stock-raising. Their compiler shows, in an accompanying set of notes, that he is fully aware of the inadequacy, and even inaccuracy, of much of the published data on which his maps have had to be based: but he has made a real attempt to summarize existing knowledge, such as it is, and to make a geographical synthesis of the facts collected by several diverse sciences. Each map has its special features, and reference can be made only to certain aspects of particular interest. The detail for some districts in Map (1) emphasizes the need for the intensive study of the seasonal movements of livestock in other areas. Maps (2) and (3) show the very uneven distribution of the various types of stock and emphasize the outstanding importance of the northern, tsetse-free belt. Map (4) must be the first attempt to illustrate cartographically the appalling lack of meat in most West African diets. A few districts, generally sparsely populated, have an average consumption of meat per caput per annum of more than 35 kilograms (77 lb.); but over more than half of the total area, including nearly all districts with a high density of population, consumption is less than 8 kilograms (17·6 lb.), and for many tsetse-infested areas, under 1 kilogram (2·2 lb.). Yet so eager is the African to obtain meat whenever he can—and provided he can afford it—that stock and meat travel great distances, usually along the fairly well defined routes shown in Map (5), to the markets held regularly all over West Africa. An inset to Map (5), showing the foreign trade in livestock and its products in a typical year, emphasizes the great dependence of the British colonies on supplies from neighbouring French territories. Map (6), the most geographical, is also the most complicated and tentative of the series: an attempt to indicate zones and regions of stock-raising on the basis of the facts presented in the other maps. Whatever its shortcomings, it succeeds in emphasizing certain similarities between areas that are sometimes politically, culturally, and even physically diverse.

The map of the density of population is more detailed, more comprehensive, and more complete than any population map hitherto published for this part of Africa. It is based upon all available sources, which differ greatly in reliability and date, and the cartographic representation varies between the colonies: in most cases, densities are calculated on the basis of administrative units, but for some areas—Nigeria, for example—isopleths are used. Despite all the difficulties, the final result is a most valuable and much-needed contribution to the

study of the social and economic geography of West Africa, showing not only the very unequal distribution of population, but also the high densities (over 50 per sq. km. or 130 per sq. mile) in several isolated inland areas.

The last map, an ethnic map of the territory of Gabon, French Equatorial Africa, is a reminder that numbers by themselves are inadequate for a full geographical analysis, which must take account of ethnic diversity. Eight ethnic groups are recognized, all of them widely scattered through the area: the Fang are the best known and largest of these communities.

By British standards, the cartography and reproduction of these maps are poor, but the information presented is invaluable. The maps are at once a revision and an extension of the maps published earlier in the 'Atlas des colonies françaises' (Paris, 1933). Twelve years ago the reviewer of this atlas in the *Journal* (85 (1935) 99–100) asked "Is it altogether too sanguine to look forward to a day when the British Empire will be as adequately represented?" as was France overseas in the atlas. Perhaps it would not show undue impatience to repeat the question in the hope that it may some day be satisfactorily answered in high places. R. W. S.

AN AFRICAN ARISTOCRACY: rank among the Swazi. By HILDA KUPER. *London: Oxford University Press (for the International African Institute)*, 1947. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xii+252 *pages; maps, diagrams, and illustrations.* 30*s*

Mrs. Kuper's account of the Swazi is clear, concise, and relevant to its theme, which is the political structure of the people and the part played among them by notions of rank. Mrs. Kuper was a pupil of the late Bronislaw Malinowski and has faithfully followed his methods of descriptive analysis. An account is given of the Swazi kingship and its historical development, of the relations between king, queen mother, princes, royal and aristocratic clans, and commoner clans; and it is shown how the dominant aristocratic values leave their stamp on all the more important social activities of the Swazi. The hierarchical plan of Swazi society is evident in kinship relations, in domestic life, in age groupings, in ritual categories, in distribution of wealth, in funerary ceremonial, and so forth. This is clearly brought out by Mrs. Kuper whose descriptions could scarcely be bettered. The account of the ritualization of the king and the drama of kingship, in which the whole political system of the Swazi is enacted, may be regarded as one of the best expositions yet written of African kingship as a sacred office embodying the highest values of a people, their sense of oneness, and their will to survive as a society and to persist as a culture.

The book cannot however be said to make any important advance in anthropological theory. Indeed the theoretical discussions introduced into the description are sometimes naïve. This is due to the methods of analysis used. Rank is the theme of the book and everything relevant to social stratification is described. The description is organized around an institution and not around a sociological problem—a defect found in the writings of most of Malinowski's students. Analysis cannot therefore rise above a descriptive level. Nevertheless, observation and description are so excellent that others can use the material recorded for theoretical analysis where the author has not done so herself. E. E. E. P.

WIND IN THE SAHARA. By R. V. C. BODLEY. *London: Robert Hale*, 1947. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 278 *pages.* 12*s* 6*d*

The romantic title stands for a romantic book. The author is a one-time regular soldier who, disillusioned by the peace-making of 1918, decided to cure his spiritual malaise by escape from our civilization. Upon a hint from Lawrence, he sought a Lawrencian environment. He went to the desert Arabs in Algeria

where he stayed for seven years, sharing their daily life, becoming one of them, and adopting their habits and even religion (without, apparently, being expected to take the final step—circumcision). His memories are presented in this slender, colloquially written book.

The moral convictions and sincerity of the author command respect. The description of the country and its people is always vivid and sometimes convincing. It is interesting to read about the daily life, about sheep-raising and marketing, feasting, and recreation in the desert and the oasis. But one cannot help being aware of the book's many shortcomings in other respects. It adds nothing to our geographical knowledge. Without maps or photographs the descriptions in the text remain somewhat nebulous. As an ethnographic account it is, to say the least, amateurish: the repeated insistence on the dissimilarity of the true Arab sheikh from his namesake in the American movies gives its level.

When the author discusses features of Moslem civilization his errors are conspicuous. To attribute the Moslem manner of worship with the head covered to the fact that the Arab turban cannot be easily taken off, or almsgiving to nomadic (as against urban) life, strikes the reviewer as somewhat naïve (p. 58). The account of magic spells, whose effectiveness the author reports without comment, requires a credulous reader (pp. 107–8). And to say that Mohammedans are restricted to three legal wives (p. 58) is simply wrong. So is the somewhat summary treatment of Moslem divorce laws which, according to the author, "do not specially favour men" (p. 122): all the pronouncements in the Koran and the large majority of statements on divorce in the body of Moslem law consider the man's position only.

The author's interests extend also to political problems and the future of Arabs, Jews, and the Moslem world at large. The references to French rule in North Africa are sketchy and anecdotal; nor could its many aspects be fully explored from the standpoint of the desert nomad only. The unity of the Moslem world is another problem which the author views from a restricted angle; the deep fissions of sectarianism are nowhere mentioned. The short chapter on the Algerian Jews is interesting and gives a picture familiar from other parts of North Africa. But the author's discussion of modern Zionism carries little conviction: his prediction that after the war European Zionism would disappear has already been proved wrong.

The book is one of a type. Like many of its predecessors 'Wind in the Sahara' idealizes the Arab. The natural gentleman of the desert, the hero of nineteenth-century travellers, has come to life again—because he has been looked for in the same old romantic fashion. He is a creation of sentiment, not the result of dispassionate enquiry. S. F. N.

NORTH AMERICA

ELEMENTS OF SOIL CONSERVATION. By HUGH HAMMOND BENNETT. *New York: McGraw-Hill*, 1947. 8×5½ *inches;* x+406 *pages; illustrations.* $3.20

This latest book by the Chief of the U.S. Soil Conservation Service is, in effect, an abbreviated and up-to-date edition of his much larger work 'Soil Conservation,' first published in 1939. It contains however much new material derived from the experience and knowledge gained in the last eight years. In 1939 the great work of the Soil Conservation Service was only beginning. Now it is possible to look back on an achievement as deserving of national gratitude as any military victory. The work of the Service is a magnificent example of the organized triumph—as yet incomplete—of human society over Nature.

Dr. Bennett begins with a description of the erosion problem in the United States and of the causes, effects, and extent of soil erosion. This story, now well known, does not lose its drama by being retold and Dr. Bennett has a genius for clear and simple description. This is particularly evident in the chapters on the relationship of climate and soil characteristics to erosion phenomena—subjects which can be highly technical but can, as Dr. Bennett shows, be explained in plain American without loss of meaning.

The great achievement of the war years was the steady unfolding of a national programme of soil conservation, briefly defined as "the scientific use of land." The programme, which appears to have been enthusiastically taken up, aims at the establishment and maintenance of a stable rural community rooted in a stable soil. It embraces the physical, economic, and social aspects of soil conservation. It is based on the voluntary cooperation of land users in treating their land correctly, and on the development of the soil conservation district as a mechanism for cooperative land-use planning. The districts usually embrace a complete geographical region—for example, a catchment area—and are thus eminently suitable as units for land-use planning. Through these districts, established under State law, government aid and facilities can be most effectively brought into play in response to the direct demand of the land users. The first district was organized in 1937; in June 1946 more than 1600 districts had been formed, covering 875,000,000 acres and including 3,900,000 farmers: this represents 46 per cent. of the total land area of the United States.

The planning of land use within a district is based on a very simple classification into eight land-capability classes. When the optimal use for each parcel of land has been determined, adjustments are made in the ideal plan to fit it into the existing social and economic conditions in the district. An essential feature of the planning is that it is done not in an office but in the field, and by the expert and the farmer himself.

A score of other agencies of the Departments of Agriculture and of the Interior have collaborated with the Soil Conservation Service to produce the conservation programme, which comprehends not only erosion control but also forestry, agricultural credit, education, pest control, rural electrification, preservation of wild life, irrigation, geological survey, national parks, etc. Much of Dr. Bennett's book is taken up with practical details of the different soil-conservation measures which are the ultimate units from which this vast, spontaneous plan for saving the soil of a continent has been integrated.

G. V. J.

CENTRAL AND SOUTH AMERICA

POR TIERRAS DE INDIOS. By TIBOR SEKELJ. *Buenos Aires: Ediciones Peuser*, 1946. 9×6 *inches;* 238 *pages; end-paper maps and illustrations.* $Arg.8.50

Readers of a previous book by Dr. Sekelj, 'Tempestad sobre el Aconcagua,' will be equally pleased with this agreeably written volume. 'Through Indian territory' is an account of a visit to part of Brazil's State of Matto Grosso.

Dr. Sekelj was born in Yugo-Slavia thirty-five years ago and went to Argentina in 1939. He is a lawyer (Zagreb University), journalist, enthusiastic mountain climber, and equally enthusiastic believer in Esperanto. It was during an Esperantist Congress in Rio de Janeiro that the author, after ascending the difficult Dedo de Deus in company with a Brazilian climbing club, formulated plans to visit Matto Grosso. He sought and obtained the advice of General Candido Rondon, veteran of the Brazilian sertão, was introduced to organizers of the Fundação Brasil Central and became their guest, receiving the benefit of

their road, air, and camp services. The Brazilian Government understandably frowns upon amateur and unauthorized expeditions into the wild interior of the country, so that Dr. Sekelj and his small party, which included throughout a courageous young Argentine lady who became the wife of the author before their return to civilization, were never far from friendly assistance though they had a taste of the discomforts of the bush now and again.

Had the author studied the detailed Reports of the Rondon Commission before making his journey, he would have discovered that the "blank" of the Brazilian interior on the map has long been reduced; that the "mysteries" of lost cities, lost tribes, and hidden treasure have vanished before the advance of the trained observer; but he would have lost a lot of the pleasure of the romantic and might not have written such an amusing book.

The party was offered the use of an aeroplane to cover the 1500 kilometres between Rio and Aragarças, principal base of the Foundation, but they preferred to take train to Uberlandia, centre of the cattle-raising region of Minas Geraes. Thence they proceeded by lorry to Aragarças, a week's travel over mountainous roads made boggy by rains. The new town has a residential street, a radio transmission station, brickworks, a sawmill, an aerodrome, a hospital, schools, electric light and power, a cinema and sports grounds; in fact all the facilities of modern civilization transported to the bush. Nearby are diamond diggings operated in the primitive manner.

Between Aragarças and the Rio das Mortes lies a belt of forest 300 kilometres wide which has been traversed and examined by another Brazilian enterprise, the Roncador–Xingú expedition, headed by Colonel Vanique, who also welcomed and assisted the Sekelj party. They were taken by air to the riverine camp destined to be the site of a new city, Chavantina. Thence they returned by 'plane to the main base and eventually went down the Araguaya river in a boat belonging to the Foundation to another outpost, São Felix, 1000 kilometres distant. They were now in the territory of the friendly Carayá tribes and later made acquaintance with another native group, the Yavaé, on the great island of Bananal. Here the exposed conditions wore out the spirit of adventure of Dr. Sekelj and his companion and they turned homewards.

The book is well produced, in Argentina; the illustrations do not however equal the excellent typography. The book has no dating and no index but perhaps neither was necessary. L. E. J.

INDUSTRIALISATION OF LATIN AMERICA. By Lloyd J. Hughlett. *New York: McGraw-Hill*, 1946. 9×6 *inches;* x+508 *pages; maps, diagrams, and illustrations.* 25*s*

This is a comprehensive, well-informed, and up-to-date work by various contributors which describes the remarkable developments towards industrialization in Latin American countries, notably in Brazil, Argentina, Chile, and Mexico. A general chapter on the economic background is followed by seventeen others on various branches of industry, including transport and communications, each of which, written by one or more specialists, notes the progress made according to statistical data country by country. The wealth of material collected in this volume is designed primarily for the information of American exporters and others trading with Latin America, but it will prove useful to any one whose commercial or geographical interests make sound information on this wide and important field desirable.

Although doubts are expressed here and there by the contributors whether some of the war-time industrial expansion is sound enough to survive into peace conditions, and although there is distinct bias towards the American standpoint,

the general style is factual and objective. The individual chapters naturally vary in quality; the majority are informative and well written, in particular those on the chemical, metal-working, petroleum, sugar, and textile industries; a few are somewhat superficial and disconnected in form. Misprints, such as the date 1833 on p. 151, Rio dal Velhas on p. 222, Santa Klena on p. 296, and the misstated caption on p. 451, are rare; but the omission of all stress accents and tilde signs in the printing of names seems strange.

It is clear from the facts recorded in this volume that the Latin American countries have embarked upon far-reaching policies of economic nationalism as a result of the upheavals of the two world wars and especially of the depression of the early 1930's, and that among the leading expressions of these policies are the fostering and sponsoring of manufactures and the nationalization of certain resources and of the means of transport. Consequently capital goods and certain raw materials will form a growing proportion of imports into those countries, whose governments will not hesitate to give protection to established manufactures which are threatened by foreign competition. E. W. S.

PACIFIC

ISLANDS OF DANGER. By Ernest Beaglehole. *Wellington: Progressive Publishing Soc.*, 1944. 8½×5½ *inches;* xii+212 *pages; sketch-maps and illustrations.* 12*s* 6*d*

This book gives an account of everyday life during six months spent by the author and his wife on ethnological work in Puka-Puka. The 'Islands of danger,' as the group was named by Commodore Byron who sighted them in 1765, are situated nearly 400 miles east of Samoa but administratively they form part of the Cook Islands Dependency of New Zealand. Puka-Puka is a small atoll shaped in plan like a spur fitted to an imaginary boot the toe of which points to the east. The only permanently inhabited island is Puka-Puka itself on the northern arm of the spur; here are situated three villages which own the seasonally occupied islands lying on the east and south of the lagoon.

The book suffers seriously from a striving for effect in literary style which ill becomes the author. It is not until one has become immune to this and is prepared to overlook the frequent occurrence of such phrases as "stylistically somewhat antiquated shirt" (used to describe the Sunday dress of a Puka-Pukan native) that one can begin to appreciate the account. Thereafter one finds a very sympathetic picture of the carefree daily life of a community where Christianity, though introduced with that lack of imagination so common in the South Seas, has not been applied with too heavy a hand. The free attitude of the Puka-Pukans towards matters of sex, for example, is relatively unsullied in spite of a certain coarse sense of humour in such matters. The author has been at considerable pains to enable the reader to look at this and other matters from the point of view of a tiny Polynesian community.

Typographically the book is a credit to the house of Whitcombe and Tombs which in recent years has done so much to raise the standard of book production in New Zealand. F. H. W. G.

THE PACIFIC OCEAN. By Felix Riesenberg. *London: Museum Press*, 1947. 9×5½ *inches;* 284 *pages; sketch-maps and illustrations.* 18*s*

Given the importance of the Pacific region in recent world affairs, it is natural that popular attention should increasingly be attracted to the history of its exploration, especially in America. The book under review is one of several lately published to satisfy the demands of the general reader. Its merit is that

the author is a practical seaman and is thus able to appreciate the achievements and problems of the early navigators. He narrates clearly the incidents of the great voyages from Balboa to the sealers and whalers of the last century. His concern is with character and action; scientific problems and political motives receive incidental reference only. He has also limited his subject rather narrowly: Australian waters are excluded, so that Tasman is mentioned very briefly, without reference to New Zealand, and the account of Captain Cook passes over his exploration of the eastern coasts of Australia. A somewhat surprising omission is that of La Pérouse. These minor details apart, the book is a readable and informative introduction to a notable human achievement.

G. R. C.

POLAR REGIONS

POLAR EXPLORATION. By ANDREW CROFT. (2nd Edn.) *London: A. and C. Black*, 1947. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xii+268 *pages; maps and illustrations.* 15*s*

Many polar books start life at a guinea or twenty-five shillings and end their days as five shilling "remainders." It is cheering therefore to see one which has attained a second edition—and at twice the original price. I know of no other book of its kind that deserves better such a fate, though rising costs and double the original number of illustrations no doubt account in part for the price. To compress into a relatively inexpensive volume complete and interesting accounts of all the principal expeditions of this century was no mean feat.

In the eight years since the first edition the author has added greatly to his experience and in particular to his outstanding knowledge of the technique of polar travel. It is a pity therefore that the new edition is really only a reprint with but a brief account of developments in the intervening years. Let us hope that the publishers contemplate a third edition which will be really up to date. Few men are better equipped than the author to appreciate the changes brought by the war to polar exploration, which may now be said to be entering a new epoch of full mechanization.

J. W. W.

PHYSICAL AND BIOLOGICAL GEOGRAPHY

PRINCIPLES OF AGRICULTURAL BOTANY. By ALEXANDER NELSON. *London: Thomas Nelson*, 1946. 9×6 *inches;* xviii+556 *pages; diagrams and illustrations.* 35*s*

Dr. Nelson's is the most profusely illustrated text-book on agricultural botany that has appeared in this country. The photographic illustrations, most of them excellent, are a feature of the book. There are also a number of colour photographs of stained sections which would be of more assistance to the student if the stains were named. The author covers morphology, physiology, weeds, mycology, and plant breeding. The chapters end with a list of books for future reading—a most valuable list. Though "marcottage" and "ratooning" are mentioned, the book deals almost exclusively with the agriculture of temperate climates. The use of vernacular names without any Latin equivalents is sometimes unfortunate. For example, "runch" appears to be a Scottish equivalent of charloch. The word "cultigen" is not synonymous with crop plant but means a plant or group of apparent specific rank which is known only in cultivation. Epidermi is not the plural of epidermis; and on p. 73 Miss Janaki Ammal's names are reversed. The chapters on the identification of plants from their vegetative character are valuable but would be improved by rearrangement as dichotomous keys. The author divides the tissues at the stem apex into three primary histogens—dermatogen, periblem, and plerome—a theoretical classifi-

cation that does not now command general acceptance and has been largely replaced by Schmidt's division into "tunica" and "corpus." Finally, figure 26b is upside down. In spite of these imperfections there is no doubt that the book will be of great value to students and agriculturists. A. H. G A.

INTRODUCTION TO PLANT ECOLOGY. By A. G. TANSLEY. *London: George Allen and Unwin*, 1946. 8×5 *inches; 260 pages; sketch-maps and diagrams. 8s 6d*

Plant ecology, like geography, is a synthesizing subject. In its wide sense as defined by Professor Tansley—the study of the "household affairs" of plants as they exist in their natural homes—it requires a knowledge of many of the well-recognized divisions of botanical science. The student of plant ecology requires a basic training in taxonomy, genetics and cytology, morphology, anatomy and histology, pedology, and climatology, and—probably most important—an understanding of the modern developments in plant physiology which are providing data from which it will be possible to define exactly the relative importance for plant growth, development and reproduction of the individual factors of the ecological environment.

Assuming this fundamental training and knowledge, Professor Tansley has produced in an entirely revised and enlarged edition of his earlier 'Practical plant ecology' (1923) an introduction to those aspects of plant ecology necessary for a student beginning the subject at an advanced school or early university stage. Having been concerned with the training of so many ecologists whose subsequent work has added much knowledge to the subject, particularly for the British Colonial Empire, no one is better qualified than Professor Tansley to know what their initial requirements are.

The first of the three more important sections of the book deals with the structure, distribution, and development of vegetation. The examples of plant communities, succession, and life forms are based on data from the vegetation of Great Britain. The second main section, on methods of studying vegetation, obviously cannot cover in detail within the space available all the modern developments in this field, particularly in the study of crop and grassland associations and behaviours and of those extensive methods of survey which must be adopted when dealing with vast areas of country with small staff and limited facilities. However the book is again intended for students and these extensions in technique can be acquired later. Crop and grassland (applied) ecology is a large subject in itself.

The last main section of the book defines and discusses the habitat in relation to climatic and physiographic, edaphic, and biotic factors. Special emphasis is laid in this new section of the book on soils in their relation to the distribution of vegetation and the relationship of communities. One would have liked to see equal if not more emphasis given to the techniques adopted and basic principles involved in the study of the physiological habitat or environment, particularly with reference to the use of controlled environments in the study of life forms.

R. O. W.

MATHEMATICAL GEOGRAPHY

EINFÜHRUNG IN DIE KURVEN—UND FLÄCHENTHEORIE AUF vektorieller Grundlage. By C. F. BÄSCHLIN. *Zürich: Orell Füssli Verlag*, 1947. 9×6 *inches; 147 pages; diagrams*

This concise text-book gives a purely mathematical treatment of the vector theory of space curves and surfaces: it is completely general throughout and should be of use to others than the geodesists to whom it is addressed. It was

originally planned by the author to form part of a comprehensive text-book of geodesy and is not intended to replace the larger works on the subject, such as V. and K. Kommerell's 'General theory of space curves and surfaces' (Leipzig, 1911) or C. E. Weatherburn's 'Differential geometry of three dimensions' (Cambridge, 1939). Its aim is rather to bring those elements of the subject of most interest to geodesists into a convenient form. The conciseness of the vectorial treatment is admirable and an introduction on vectors is given for those unfamiliar with their use. No specialized mathematical knowledge is needed except in the last chapter on curvilinear coordinates in three dimensions where the theory of determinants and the calculus of variations is used.

After a clear exposition of the parameters required to describe space-curves and of some of their general properties, the natural geometry of surface curves is developed, that is, their expression in terms of vectors which are functions only of the arc-length. There follow two corresponding chapters on the description of surfaces by Gaussian parameters and on the natural geometry of surfaces. Some special surface curves are discussed. A complete chapter is devoted to geodesics in which special attention is given to the Gaussian formulation which has been so fruitful.

The book will serve as a useful introduction for all those who are interested in the applications of the theory of curves and surfaces. If criticism is due it is that the examples given at the end of some chapters are too few and do not adequately suggest how to apply the wealth of theoretical material. The average reader used to dealing with surfaces in polar or cartesian coordinates may find difficulty in acquiring the "feel" of natural geometry and a few more ingeniously contrived examples on familiar surfaces like the cone or ellipsoid would be helpful.

R. I. B. C.

APPARENT PLACES OF FUNDAMENTAL STARS, 1946. *London: H.M. Stationery Office (for H.M. Nautical Almanac Office)*, 1945. $10\frac{1}{2} \times 7\frac{1}{2}$ *inches;* xxxii+538 *pages.* 42*s*

Appearing first in 1941 when the world was preoccupied with other affairs, the present volume is the sixth of these annual publications which deserve to be brought to the notice of geographers who may be engaged on astronomical position finding of a precise order.

In 1935, at the Paris meeting of the International Astronomical Union, it was unanimously agreed that the apparent places of stars in all astronomical ephemerides should thereafter be based on the mean places of the *Dritter Fundamentalkatalog des Berliner Astronomischen Jahrbuchs* (F K 3). Further, that in order to obviate duplications in the several national almanacs, where of the apparent places of 3327 stars only 1279 were independent, each national almanac should publish the apparent places of only two hundred stars. These were to be selected from the F K 3 on account of their brightness and distribution in the sky to meet the needs of navigators and surveyors. The present ephemeris was then to be instituted, under the auspices of the International Astronomical Union, and by the cooperation of the five principal almanac offices in Berlin, Paris, San Fernando, Washington, and London. Computational work was to be shared by France, Germany, Spain, and the United States, whilst Great Britain would be responsible for the collection of the material, proof reading, and publication.

The selection of the 1535 fundamental stars in this work from the one catalogue, and the computation of their apparent places on the same fundamental system, has removed the difficulty which previously existed where an observer had either to take into account the different bases of computation of positions in

the various national almanacs or to limit himself to the use of stars of only one almanac. The national almanacs are now reduced to a more convenient size for the normal purposes of the majority of their users, whilst this new publication serves the needs of the specialist and brings his particular requirements compactly into one volume.

This publication has continued without break from the appearance of the first volume in January 1940, and serves as a most notable achievement of international cooperation in astronomy which has overcome the evil results of national discords. The data due from the Office of the *Connaissance des Temps*, which since 1942 have not been obtainable from France, were supplied by sharing the work between the United States and Great Britain. With this exception, the several countries have maintained their scheduled contributions. In the present 1946 volume the French, German, and Spanish versions of the introduction have been re-inserted after a lapse, due to war-time economy, since 1942.

The lay-out of the tabulated quantities of Right Ascension and Declination is similar to that of the *Nautical Almanac*. The mean places, with annual variations for the middle of the year, are given in the early pages. There follow the 10-day stars in order of their mean Right Ascensions, with their coordinates given for one decimal place more than in the *Nautical Almanac*. The Northern Circumpolar Stars and Southern Circumpolar Stars are conveniently grouped together towards the end of the volume and their quantities tabulated for each day of the year. Finally there is a series of useful tables such as those required for conversion of time and interpolation, etc.; these are more extended than the similar ones in the *Nautical Almanac*. There is the customary index of stars under their constellations with references to catalogue number and pages in the volume.

The traveller, or exploratory surveyor, will probably not need this volume nor wish to encumber himself with more than the standard edition of the *Nautical Almanac*. But the surveyor who has to make observations of a fairly large number of stars, for instance in a series of position lines from one station, will find it convenient to have this volume with him and so be provided with a wider selection of stars from which to make his choice. O. H. C.

ECONOMIC GEOGRAPHY

COLONIAL AGRICULTURAL PRODUCTION: the contribution made by native peasants and by foreign enterprise. By Sir ALAN PIM. *London: Oxford University Press (for the Royal Institute of International Affairs)*, 1946. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* x+190 *pages.* 10*s* 6*d*

Few writers have so far tried to survey in its entirety the vast problem of the agricultural development of colonial dependencies, and Sir Alan Pim, in attempting this, has wisely limited his study mainly to export crops. He shows clearly that native small-holders are important as producers of commercial, as well as of subsistence, crops and that their problems are essentially different from those of plantations capitalized and managed mainly from outside, though there is what he calls a "mutual compatibility" of the two systems. As Mr. G. E. Hubbard points out in the preface, this book is a study of facts rather than theories and is chiefly concerned with the analysis of the present situation in selected territories: the common characteristics of the areas described are that all of them are in the tropics and have attracted the investment of external capital by their capacity to produce tropical commodities in demand in the densely populated industrial countries of temperate regions. There are useful accounts

of all British tropical colonies, a long and very illuminating section on the Netherlands Indies, and shorter descriptions of the agricultural development of French West Africa, French Equatorial Africa, and the Belgian Congo. The general conditions affecting agricultural primary production are outlined with admirable clarity in an introductory chapter which prepares the reader for much of what follows in the surveys of individual territories. At the end of the book the author draws a number of conclusions, amongst which geographers will notice particularly the emphasis laid on the significance of geographical conditions. "Political considerations apart," he writes, "the methods of production in any area will largely depend on the local physical, climatic, and demographic position," and in an earlier chapter he points to the many failures, with both plantations and peasants, resulting from "the mistaken use of unsuitable land."

Sir Alan Pim has made a very thorough analysis of the widely scattered literature dealing with the political, economic, and social aspects of colonial agricultural production. Those interested in the study of colonial problems will be deeply indebted to him for his concise yet complete summary of the situation. The work has all the authority that one associates with books issued under the auspices of the Royal Institute of International Affairs, though the critical reader may be surprised to find several misprints. R. W. S.

SOCIOLOGY OF TRISTAN DA CUNHA. By PETER A. MUNCH. (Results of the Norwegian Scientific Expedition to Tristan da Cunha, 1937–38, No. 13.) *Oslo: Norske Videnskaps-Akademi*, 1945. $9\frac{1}{2} \times 6\frac{1}{2}$ *inches;* 332 *pages; maps and illustrations.* 24 *Kr.*

The thirteen members of the expedition spent three and a half months on Tristan da Cunha in the summer of 1937–38, and their reports on the meteorology, geology, botany, and zoology of the island and on the health of its inhabitants have been appearing in a special series edited by Dr. Erling Christopherson, the leader of the expedition. Some of the reports were delayed by the war, and this account of the community was completed in 1943. The authoritative history of the island by J. Brander, published in 1940, is a notable omission from the bibliography.

As a result of his study, the author concludes that the islanders showed no physical or mental degeneration due to inbreeding; he found them capable of more than ordinary physical effort and judged their average intelligence to be about the same as that of any rural community in western Europe or the United States. On the other hand, he continually emphasizes their lack of enterprise. Much of their poverty is attributed to their reluctance to make any new departure or to embark on any cooperative improvement scheme. Although there seems to be abundant evidence of this, they work hard and cheerfully when the task is a familiar and accepted one; and since they must exert themselves to maintain even the poorest existence there can be no absolute laziness. "Those who won't work" fall lowest in the social scale, and the poverty of the island's resources is such that no one can accumulate sufficient wealth to allow him to avoid work.

The potato is the most important item of diet and fish comes next; but the Norwegians found that fishing was considered a less creditable occupation than growing potatoes, partly because the less industrious members of the community tend to rely on it almost entirely. They like to be counted as farmers, though their work on the land is of the poorest kind. The climate and the shortage of tools have much to do with this, but their lack of initiative is an important factor. Only about 30 acres, a small proportion of the available good land, is under cultivation and three-quarters of this is used for potatoes. The

people say they cannot grow corn because rats eat the young shoots, but although Munch realizes that this conviction may be due to some bad experience in the past he suspects that no serious attempt has been made for several generations, in fact not since the rats first came to the island. Manure is used sparingly, but the patches are not usually hoed and the weeds are only removed with the crop. Few vegetables other than potatoes are grown; pumpkins are the most common and the others are the familiar vegetables of our own gardens; on account of the small quantity grown, none is left for the winter. Munch finds that better results are obtained with seeds sent from Cape Town than with seeds that have been carried all the way from Europe. He maintains that although the climate is unfavourable, largely because of the strong winds, the vegetable production could easily be increased. Apples grow in sheltered places in different parts of the island, but they have to be picked while green to save them from the rats.

The management of the animals is also of a low standard. Cattle, sheep, donkeys, and, till recently, pigs have been left to feed on the same pasture and the yields of stock and land are poor. The cattle fend for themselves and yield so little milk that the islanders do not trouble to milk them regularly; butter and cheese are almost unknown. In the spring and summer they rely to a large extent on the sea birds; they collect tens of thousands of eggs from penguins, mollymauks, and petrels and later in the year kill thousands of young mollymauks. As a result, the natural resources of Tristan da Cunha and Inaccessible Island are almost depleted and those of Nightingale Island are showing signs of over-taxation. As is characteristic of primitive peoples who live from hand to mouth most of the year, they make the most of any abundance while it lasts and use more than is necessary. No care is taken for the future and as the years pass it becomes more uncertain. The rats and cats have assisted in the destruction of the land birds on the island and the absence of insectivorous birds appears to be quite a serious matter.

The author does not seem to sense any urgent need for wholesale relief measures, although the future of the islanders has long been a matter of concern, to-day more than ever. Since this book was published, it has been revealed by Major Irving B. Gane, Honorary Secretary of the Tristan da Cunha Fund, that the island passed into the care of the Admiralty in 1941 ("The future of Tristan da Cunha," *The Times*, 14 October 1946); as a result of the observations made during the war, he says that in spite of all reports to the contrary the effects of inbreeding are beginning to tell, in that the children have not the same degree of intelligence as their parents. The question of the future welfare of the islanders is receiving the active consideration of H.M. Government, and for the time being a meteorological station is being maintained on the island by the Government of South Africa. Always dependent on gifts from outside, Tristan da Cunha is now stocked as it never has been before by supplies left by the Navy.

Being reassured of the safety of the islanders, one feels more disposed to appreciate the author's detailed and entertaining account of their clothing, housing, boats, industry, social life, religion, recreation, and general physiological and psychological adaptation to such a remote life. The women dress in such clothes as would have passed unnoticed in this country about thirty years ago; and while the men wear clothes as sent from Europe, the women face the difficult task of adapting the garments they receive to their own fashions. There is a sharp distinction between working and Sunday clothes. Moccasins made of sheepskin are the most common footwear, and spinning and knitting are the most important domestic industries; there is no weaving. A good deal

of time is spent in making models of boats, bullock carts, and spinning wheels for trading as souvenirs. They also make rather revolting mats from the head skins of penguins, killing hundreds of birds for the purpose.

The houses resemble Shetland houses of stone and thatch, rather shakily constructed and barely furnished because of the shortage of timber; but they often bear witness to great industry and perseverance, the best possible use being made of the scanty materials. The boats are made of canvas, stretched over a well-constructed framework and painted; they are handled with great skill, and one very useful feature is that the bow-line can be shifted to a hole in the stem just above the waterline to make it easier to pull the boat up the beach.

They are a very friendly people and the author acknowledges their great hospitality, kindness, and open confidence. Quarrels are rare and personal enmity not long maintained. They appear to have no deliberate recreations, though they seek companionship and are always involved in some sort of playful competition. Their hunting and collecting expeditions seem to be partly holiday excursions. They are very fond of dancing and do not let any event pass which can serve as an occasion for a social gathering. They talk little about religion, but possess a strong and confident belief in Providence; and the Church and its ceremonies play a great part in their lives.

Very few of the islanders have any experience of the outside world and they show little interest in its affairs. The prospect of having to compete with other people is believed to be one of the chief reasons for their steady refusal to emigrate. They display a realization of cultural inferiority, but feel themselves superior in their own domain and show active concern for the safety and welfare of any visitor who sets foot on the island. Little appears to be left of the spirit of active cooperation that flourished when their numbers were small and they supported themselves by trade with ships that called at the island. Their numbers have increased steadily from seventy-two in 1906 to two hundred and sixteen in 1941, and are now more than the diminished natural resources can properly support.

They have no active leader and the author has little that is good to say of the missionary who was in charge of the island. Mrs. Frances Repetto was judged to be the most outstanding member of the community; she is a grand-daughter of Peter Green who played an important part in the life of the island for more than sixty years. Although the author seems to have no fear for the future of the community, his account strengthens the general view that the time is approaching when there must be another large exodus from the island, like that of 1857, or else the community as a whole, like that of St. Kilda, must emigrate to the nearest mainland.

G. E. R. D.

GENERAL

ABOUT THIS EARTH: an introduction to the science of geography. By F. KINGDON WARD. *London: Jonathan Cape*, 1946. 8 × 5½ *inches;* 168 *pages.* 7*s* 6*d*

The author describes this book as "about what geography is about." An introductory chapter is followed by chapters which outline the chief facts of earth structure and surface evolution, and short chapters on deserts, rivers, gorges (a very interesting account), deltas, lakes, plains, mountains and islands, alpine regions, and tropical jungle, as well as general chapters on population and climate and a concluding chapter on "the geographer and atomic energy." The book is written in a pleasant style, which occasionally degenerates into a trite phrase. There are no maps or diagrams.

It is not clear for what class of reader the book is intended. The work is a description of the earth and not, as the sub-title states, "an introduction to the science of geography." It is not systematic enough for a student. It makes no reference to geographical methods such as the regional concept or cartographical techniques. F. W. M.

THE STORY OF WATER SUPPLY. By F. W. ROBINS. *London: Oxford University Press*, 1946. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* x+208 *pages; illustrations.* 18*s*

Under this promising title the author offers a historical story, free from too much technical detail, mainly about the history of domestic water supply. Drawing on a collection of facts gathered from his own observations, from contacts with water engineers and others, from travellers' tales, and from a wide range of literature, Mr. Robins tells of various ways in which man has obtained and distributed water from early times to the present day, finding his examples in the Phoenician, Greek, and Roman civilizations, and in Britain from Roman times onwards. Springs, ponds, rivers, and wells each receive due mention as important natural sources; and aqueducts, leats, conduits, kanats, water wheels, pumps, and pipes are in turn described as means of distributing water. Nor are the water carriers omitted; many instances are given of vessels used for carriage and storage, from the humble ostrich egg shell used by primitive natives to the mighty Great Boulder and Grand Coulée dams of modern America.

Mr. Robins has used material from many parts of the world, as is evident from his topographical index. He has avoided being too technical and has very successfully introduced a great deal of interesting historical detail. Yet he has not achieved a story, nor a history book, nor a book of reference, although 'The story of water supply' has something in common with all three. In binding together the historical details the author has introduced a certain amount of his own comment. More of these comments, used to dilute the details, might have made a more readable story.

The opening chapter on "Natural supplies" is disappointing. To instance some ten localities in which bamboo is used for water carrying does not help the story. A few well-chosen examples from the obviously abundant material at the author's disposal would have created an adequate picture of a primitive community collecting and carrying water. An impression of more careful selection is given later in the choice of English examples.

The serious student will find references to facts in the text, and to literature in footnotes, sometimes incomplete and occasionally inaccurate. The plates, many of them from the author's own photographs, are relevant, clear, and attractive. S. B.

MOUNTAIN HOLIDAYS. By JANET ADAM SMITH. *London: J. M. Dent*, 1946. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xii+194 *pages; maps and illustrations.* 15*s*

THE DELECTABLE MOUNTAINS. By DOUGLAS BUSK. *London: Hodder and Stoughton*, 1946. 9×6 *inches;* xii+274 *pages; maps and illustrations.* 21*s*

MOUNTAIN PROSPECT. By SCOTT RUSSELL. *London: Chatto and Windus*, 1946. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xvi+248 *pages; sketch-maps and illustrations.* 18*s*

A good book of mountain travel will always appeal to a wide class of reader. It may be that no author can write more than one classic book concerning his mountain experiences, or at least that many years must go by in which he can gain not merely fresh material of fact but a broadened or changed outlook on the scene of his activities. These three books however were all written at a time when it is reasonable to hope that the authors are in the midst of their mountain

careers; while they are all representative of the best tradition in mountain literature, there should be ample time for the authors to widen their mountain experience and their outlook.

The three books differ greatly from one another. Janet Adam Smith's 'Mountain holidays' deals mainly with Scottish hills for an introduction and the Central Graian Alps for the main field, with Mont Blanc hovering in the background. The style is easy, as befits holiday time, but throughout there runs a strain of intellect such as one would expect from the daughter of a distinguished Biblical scholar; nor does she pass over her debt of childhood days to W. P. Ker, Professor of Poetry at Oxford, from whom she learnt the dignity of mountains. Douglas Busk's 'The delectable mountains' covers a very wide field, for during his diplomatic career he has seen much of the world and visited ranges inaccessible to most people. Here again the author takes us with him step by step from his earliest travels, and lets us breathe some of the inspiration which the presence of the hills and the friendship of his guide, Armand Charlet, have brought him. At times he is at pains to lower his expert eye to the level of the uninitiated, and in places this has led him into verbosity or the inconvenience of a footnote; but the style as a whole is pleasing, the tone sympathetic, and the detail clearly defined. Scott Russell's 'Mountain prospect' gives us another and equally fresh outlook. Written in secret during years of captivity in Malaya, the book is the more remarkable for the clearness and consecutiveness of the narrative. The stages through which the author takes us—boyhood in the Southern Alps of New Zealand, an expedition to the Arctic, and an all too brief acquaintance with Switzerland—progressively educate us for the last stage, an expedition with Eric Shipton to the Karakoram range which suggests admirably the atmosphere as well as the difficulties of high Himalayan travel.

All three books are outstanding, in style or in material or in both combined. It is invidious to draw comparisons, for each has its own merit. One thing they have in common: they all make mountain travel real for the reader, not so much through accuracy of detail or extent of ground covered as by bringing the friendship, the enthusiasm, and the steady growth in knowledge of mountains into the foreground of the story. H. E. G. T.

ICE ATLAS OF THE NORTHERN HEMISPHERE. Compiled and published by the Hydrographic Office, United States Navy. *Washington*, 1946. 25 × 25 *inches;* vi + 106 *pages*. $8

This comprehensive atlas of ice conditions in the northern hemisphere, at sea and in rivers, tries to meet a need that has long been felt by all those concerned with navigation in the higher latitudes. The amount of information given in this atlas, the high standard of presentation, and the very large number of references consulted bear witness to the immense amount of work that has been applied to the task.

Experience will show whether the editors made a wise decision in compiling an atlas that is so large (25 × 25 inches) that it will not always be welcome at sea. This may also mislead into attributing to it too high a degree of accuracy, a danger which is enhanced by showing five different categories of sea ice conditions where, from the practical point of view, two would probably have been preferable. It is suggested that these two categories might be (*a*) the probable average limit of pack-ice, and (*b*) the probable extreme limit of pack-ice, during, say, the last twenty or thirty years. In regions where icebergs may be encountered, two additional, corresponding limits might be shown. The tabular information for ports is remarkably complete, but one cannot find an answer to the question that so often arises among the comparatively small number of

users of such an atlas: "How often, or in how many years in say 10 to 20, is a certain port closed to navigation, and for how long a period?"

Ice conditions change so rapidly at the beginning and end of the season, especially at the end, that it would not have been unreasonable to have shown the probable average limits at, say, the middle of each month instead of giving a general picture of the month as a whole. It may be for this reason, and because of a tendency in most sea areas to show extreme rather than average limits, that the charts give a pessimistic impression of the ice situation. For example, the distribution of pack-ice off the east coast and close northward of Newfoundland in May and June is hardly in keeping with the fact that the Belle Isle Strait is usually opened to navigation in June; it would seem from this series of charts that St. John's harbour is unapproachable by any but heavy ships from January to mid-April; Tallinn, at the western end of the Gulf of Finland, would not seem from the charts to be easily accessible to shipping in all except unusually severe winters; nor would one gather from the chart for May that Lulea, in the Gulf of Bothnia, is usually re-opened in the third or fourth week of May, and that Gävle is only closed during a specially bad winter; it is difficult to believe that partly unnavigable pack-ice is a normal feature of a large area in the region of the Shantarski Islands in the western side of the Sea of Okhotsk in July. C. R. B.

EARTH, MOON AND PLANETS. By FRED L. WHIPPLE.
BETWEEN THE PLANETS. By FLETCHER G. WATSON.

The Harvard Books on Astronomy series. Edited by HARLOW SHAPLEY and BART J. BOK. *Philadelphia: Blakiston Co.*, 1941 (*London: J. and A. Churchill*, 1946, 1947). $8\frac{1}{2} \times 6$ *inches;* 294 *and* 222 *pages; diagrams and illustrations.* 18*s*

These are part of a series of eight well-illustrated popular volumes, the Harvard Books on Astronomy, written by members of the staff of Harvard College Observatory. Other volumes in the same series are on telescopes and accessories, our sun, stars, and nebulae, variable stars, the milky way, and galaxies.

In the first volume reviewed here, after describing the planetary movements of the earth, attention is drawn to the fortunate combination of conditions favourable for life on its surface. The peculiar conditions in the higher atmosphere are discussed and the constitution of the earth's interior is speculated. In the chapters on the moon a good account is given of the surface features, with a leaning to accept a volcanic origin for the numerous craters.

The second volume deals with asteroids, comets, meteor showers, and meteorites. Eighteen pages are devoted to a description of meteorite craters on the earth's surface, of which the first connected account appeared in this *Journal* (81 (1933) 227). Since then three more examples have been added to the list: Boxhole in Central Australia, Dalgaranga in Western Australia, and Brenham in Kansas; but the last of these is really a percussion pit rather than an explosion crater. The possibility of fossil craters disclosed by rock structures is suggested. The author evidently has a poor idea of geography when he states (p. 138) "Since meteorites are found in all parts of the world their names constitute a veritable geography lesson." L. J. S.

WHEN THE GOING WAS GOOD. By EVELYN WAUGH. *London: Duckworth*, 1946. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 318 *pages; sketch-map and frontispiece.* 15*s*

Evelyn Waugh is fortunate to have been able to travel 'When the going was good.' He at least has memories of places and incidents that must be a great source of entertainment to himself. To others these accounts may be entertaining or they may be merely irritating. As the author himself says, "he never

aspired to being a great traveller," and his book is of small geographical interest. It is a reprint of extracts from books published in the early 'thirties. The first chapter is entitled "A pleasure cruise in 1929: an extract from 'Labels.'" Cairo, Malta, Crete, Athens, and other places in the Mediterranean were visited. The Abyssinian Coronation visit is retold in the next chapter. In Chapter 3 an extract from 'Remote people' describes incidents and people encountered on a journey to Aden and East Africa. A journey to Brazil follows and the book ends with a chapter from 'Waugh in Abyssinia.' Addis Ababa on the eve of war seems far removed from our post-war world. J. M. M. H.

GEOGRAPHICAL BY-WAYS AND SOME OTHER GEOGRAPHICAL essays. By Col. Sir Charles Arden-Close. *London: Edward Arnold*, 1947. $7\frac{1}{2} \times 5$ *inches;* x+179 *pages; diagrams.* 7*s* 6*d*

This is a mixed bag of a dozen essays, most of which have already appeared during the last twenty years in this *Journal* or in other periodicals, though in a few cases more recent findings have been incorporated. They are written in a light, readable style and in almost every one there is something to arrest or intrigue even the general reader.

"Wandering continents?" deals with the inconclusive observations designed to test the suspected westward "drift" of Greenland. "The Old English mile" contains an interesting series of data for determining its length, based on material ranging from Saxon Charters *via* Gough's Map (of *c.* 1335) to the Elizabethan map-makers. Next follows "The levels of land and sea" with an account of the O.S. datum level and the problem of the relative movements of sea and land. There is an amusing note on "Antipodes" in which exact definition leads to the unexpected conclusion that only the Poles are mutually antipodal; and a short article on "The horizon" in which the artist is warned that even in a seascape it is not a straight line. Perhaps most surprising of all is "Some geographical centres" which yields the fact that the centres of land and of population both of England and also of England-and-Wales, as well as one of two points farthest from the sea, all lie within a narrow strip of north Warwickshire hardly 20 miles long.

With "Some curious map projections" we come to something more serious and a hint of some of the directions in which modern cartography is developing. The interest of this section would be considerably enhanced by a few more diagrams—for example, a portion of Craig's "Mecca Map" or the Square Orthomorphic World-Map of O. S. Adams. The essay ends with a cartographic joke in the shape of a square equal-area map of the world.

"Map references" appears (if one may read between the lines) to reveal the fact that the author—a former Director-General of the Ordnance Survey—is far from satisfied both with the official insistence on having a "grid" on the map and with the kilometric application of it. Next comes "The rainfall of Palestine," with an explanation of "the former rain and the latter rain" of *Joel ii.* 23 and a short discussion of the interesting question whether the decreasing production of Palestine during historical times has been due to decreasing rainfall or to faulty agriculture.

The book ends with three essays which deal with more usual aspects of geography. One, "The international map of the world," gives a useful summary of the steps which led to its inauguration and of some of the resulting maps. The second, "Space, food and population," is all too short, though here the writer is perhaps less at home with his subject—the desperately important figures relating to the "optimum" populations of this and several other countries and of the world as a whole. Last and longest is an account of "International

Geographical Congresses" from 1871 to the present day. Here, though the essay will make the least appeal to the general reader, there is much food for reflection in the lists of questions discussed which form a most interesting commentary on the development of the scope and outlook of modern geography.

H. P.

A BOOK OF RECENT EXPLORATION. By CHARLES E. KEY. *London: George Harrap*, 1946. 8 × 5½ *inches; 233 pages; sketch-maps and illustrations.* 8*s* 6*d*

This book has been largely compiled, as is stated in the preface, from papers read before the Society. Each of the twenty-six short chapters deals with an expedition or with related expeditions made between 1913 and 1938 and most parts of the world receive attention; the last chapter is on Beebe's adventures beneath the sea and on Piccard's in the stratosphere.

The author's excellent intention is to describe the more significant recent expeditions in popular terms. In most chapters, particularly those dealing with arctic journeys, he has succeeded in making clear and interesting abstracts of the expeditions' reports. But, as is to be expected in a book of this kind, there is a considerable emphasis on the unusual and the spectacular and some of the earlier chapters contain little but unconnected incident. The eleven sketch-maps illustrate less than half the expeditions described and do not always show a skilful choice of place-names; they are seldom referred to in the text. This is a pity, for with a little modification they might have served not only to illustrate but to coordinate the chapters relating to each region. The map of New Guinea at page 13 indicates coastal railways which certainly do not exist. The thirteen photographic illustrations are from books of the expeditions and, though good, they too show little relevance to the text.

The book is well printed and generally free from errors; on page 123 "radio transformer" should evidently be "radio transmitter" and on page 196 the use of the word "pram" for a Norwegian boat is attributed to navy slang. F. G.

MORE SAILING DAYS. By K. ADLARD COLES. *London: Robert Ross*, 1947. 10 × 7½ *inches; 158 pages; sketch-maps and illustrations.* 21*s*

The writer, who is well known as an experienced practical yachtsman, describes a number of cruises and races in the English Channel in 1945 and 1946. The book is well illustrated by many good photographs taken under varied conditions. Written with enthusiastic restraint by an expert, it makes very pleasant reading and will be enjoyed by many who are not able to indulge in yacht sailing.

R. H.

CORRECTION

We regret that the review of 'The wild green earth' by Bernard Fergusson in our last issue (vol. 109, pp. 122–3) requires correcting. During the 1944 Burma campaign the brigade led by Brigadier Fergusson operated in the Kachin Hills, not in the Karen Hills as stated in the review

ADDITIONS TO THE LIBRARY AND MAP ROOM

EUROPE

CONTINENTAL MOTORING, 1947
By K. Graham I. Scott. $7\frac{1}{2} \times 5$. 128 pp. Maps. *London: Todd*, 1947. 12*s* 6*d*

THE LAND OF BRITAIN AND HOW IT IS USED
By L. D. Stamp. 8×5. 80 pp. Sketch-maps and illustrations. *London: British Council*, 1946

THE GROWTH OF BRISTOL
By S. J. Jones. (*Trans. Inst. Brit. Geogr.* 11 (1946) 57–83; maps)

THE MINERAL RESOURCES OF SCOTLAND
By M. Macgregor. (*Proc. R. Philos. Soc. Glasgow*, 70 (1945) 27–42)

THE SECOND CITY
By C. A. Oakley. $8\frac{1}{2} \times 5\frac{1}{2}$. x+350 pp. Illustrations. *London: Blackie*, 1947. 10*s* 6*d*

A history of the growth of modern Glasgow, with special emphasis on social life

THE CHARACTER AND PURPOSE OF THE HEBRIDEAN BLACK HOUSE
By W. Kissling. (Extr. fr. *Journ. R. Anthrop. Soc.* 73 (1943) 75–100; illustrations)

GÉOMORPHOLOGIE DE LA PORTE DE BECKOV [SLOVAKIA]
By M. Luknis. (*Publ. Stdtneho Geolog. Ustavu*, 15, *Bratislava*, 1946, 32 pp.) *In Slovak: French summary*

ZUR STADTGEOGRAPHIE VON LE HAVRE
By K. Wiche. (*Mitt. Geogr. Ges. Wien*, 89 (1946) 34–54; plans)

BIBLIOGRAFIA GEOGR. DELLA REGIONE ITALIANE, 1943–44: Ed. E. Migliorini. (Soc. Ital. Geogr.)
9×7. 78 pp. *Rome*, 1947

TRIESTE. SEINE ENTWICKLUNG UND SEINE FUNKTION ALS HAFEN
By J. Matznetter. (*Mitt. Geogr. Ges. Wien*, 89 (1946) 11–33; sketch-maps)

RELAZIONI FRA I FENOMENI SISMICI E LE MANIFESTAZIONI VULCANICHE NEL MAR EGEO E NELLA GRECIA ORIENTALE
By W. A. Critikos. (*Geofisica, Firenze*, 8 (1946) 145–59; sketch-maps)

ORIGIN OF THE DUTCH COAST
By J. H. F. Umbgrove. (*Proc. K. Nederl. Ac. Wissens*, 50 (1947) 227–36; diagrams)

SPAIN EVERLASTING
By S. F. A. Coles. $8\frac{1}{2} \times 5\frac{1}{2}$. 248 pp. Illustrations. *London: Hollis and Carter*, 1946. 18*s*

An account of travel in Spain with reflections on Spanish history, art, and life. Excellent illustrations

UNIRRIGATED COTTON IN SOUTHERN RUSSIA AND THE DANUBIAN COUNTRIES
By N. Jasny. (*Foreign Agric.* 11 (1947) 1–14; sketch-maps)

PROBLÈMES DE PHYSIOLOGIE ANIMALE DANS LA MER NOIRE
By E. A. Pora. (*Bull. Inst. Océanogr. Monaco*, 903 (1946), pp. 43; sketch-maps)

ASIA

SAUDI ARABIA: with an account of the development of its natural resources
By K. S. Twitchell. $8 \times 5\frac{1}{2}$. xiv+192 pp. Illustrations. *Princeton, N.J.: Univ. Press*, 1947. 15*s*

The author is an American mining engineer with twenty years' experience in Arabia. After a general account of the country and its peoples, he describes the recent development of the resources, particularly oil, and the economic organization

THE CLIMATIC PROVINCES OF CHINA
By A. Lu. (*Journ. Geogr. Soc. China*, 12–13 (1945–46) 15–24)

ON MAJOR TECTONIC FORMS OF CHINA
By T. K. Huang. (*Geol. Mem. China A.*, no. 20 (1945) 166 pp.; maps)

OLD KOREA
By Elizabeth Keith and E. K. Robertson Scott. $11 \times 8\frac{1}{2}$. 72 pp. Colour-plates. *London: Hutchinson*, 1946. 42*s*

FORESTS AND FOREST RESOURCES OF INDIA
By Sir Herbert Howard. (*J. R. Soc. Arts*, 95 (1947) 484–501)

THE SOILS OF CEYLON
By A. W. R. Joachim. (*Bull. Ceylon G. Soc.* 2 (1947) 12–18)

THE CARTOGRAPHY OF JAPAN DURING THE MIDDLE TOKUGAWA ERA
By G. Kiss. (*Ann. Assocn. Amer. G.* 37 (1947) 101–19; illustrations)

OKINAWA AND ITS PEOPLE
By P. E. Steiner. (*Sc. Monthly*, 64 (1947) 233–41; 306–12)

BOERJATIË [Buryat-Mongol region]
By B. Raptschinsky. (*Ts. Econom. G.* 38 (1947) 109–18)

OROGRAPHY AND GEOMORPHOLOGY OF THE EASTERN PART OF EASTERN SAIAN
By S. V. Obrutchev. (*Iz. Geogr. Soc. U.S.S.R.* 78 (1946) 479–98). In Russian

DAGGERS AND SWORDS IN WESTERN ASIA: a study from prehistoric times to 600 B.C.
By R. Maxwell-Hyslop. (*Iraq*, 8 (1946) 1–66; map and illustrations)

AFRICA

LA CONSERVATION DU SOL AU CONGO BELGE
By G. Tondeur. (*Bul. Agric. Congo belge*, 38 (1947) 211–314)

EROSION AND TECTONICS IN THE EAST AFRICAN RIFT SYSTEM
By F. Dixey. (*Q. Journ. Geol. Soc. London*, 102 (1946) 339–88; map)

DAR ES SALAAM, 1860–1940
By C. Gillman. (*Tanganyika Notes, etc.*, No. 20, Dec. 1945, pp. 23; plans)

O CANAL DE MUTU
By P. de Sequeira Zilhão and F. Cruz. (*Bol. Soc. G. Lisboã*, 64 (1946) 517–36; sketch-maps and illustrations)

A survey of the channel which formerly gave access from the Zambezi to Quelimane harbour

GEOGRAPHY OF NIGERIA
C. T. Quinn-Young and T. Herdman. 7×5. viii+220 pp.; sketch-maps and illustrations. *London: Longmans, Green*, 1946. 5*s*

SOUTH AFRICA: a planned tour of the country to-day
By A. W. Wells. New ed. $7\frac{1}{2}\times5$. xiv +434 pp. Maps and illustrations. *London: J. M. Dent*, 1947 16*s*

Revised edition; first published in 1939. Endeavours to combine the features of a guide and a travel book, with much historical information

NORTH AMERICA

LA CÔTE NORD DU SAINT-LAURENT
By B. Brouillette. (*Rev. Canadienne Géogr.* 1 (1947) 3–20)

ALONG THE BIG BEND HIGHWAY. [Brit. Columbia]
By C. Mackay. (*Beaver*, no. 277 (1946) 14–21)

THE ORIGIN OF KOOTENAY LAKE
By S. J. Schofield. (*Trans. R. Soc. Canada*, 40, iv (1946) 93–8)

THE LIFE HISTORY OF LAKE AGASSIZ: alternative interpretation
By C. C. Nikiforoff. (*Amer. Journ. Sc.* 245 (1947) 205–39)

FRANCIS DRAKE AND THE CALIFORNIA INDIANS, 1579
By F. Heizer. (*Univ. California Publ. Amer. Archaeol.* 42 (1947) 251–92)

From a study of the records, the author concludes that the Indians encountered by Drake were the Coast Miwok Indians, and that he landed at Drake's Bay

SUBMARINE PHOTOGRAPHY OFF THE CALIFORNIA COAST
By F. P. Shepard and K. O. Emery. (*Journ. Geology*, 54 (1946) 306–21)

SOUTH AND CENTRAL AMERICA

THE NATURAL VEGETATION OF TRINIDAD
By J. S. Beard. (*Oxford Forestry Mem.* 20 (1945) 152 pp.; illustrations)

THE AGRICULTURAL REGIONS OF GUATEMALA
By E. C. Higbee. (*Geogr. Rev.* 37 (1947) 177–201; map and illustrations)

INDIANS OF THE HIGH ANDES. Publ. by the Committee on Co-operation in Latin America. $8\frac{1}{2}\times5\frac{1}{2}$. xiv+330 pp. *New York*, 1946. 12*s* 6*d*

STRUCTURAL EVOLUTION OF THE SOUTH AMERICAN ANDES
By V. Oppenheim. (*Amer. Journ. Sc.* 245 (1947) 158–74)

THE MASTERS AND THE SLAVES: a study in the development of Brazilian civilization
By Gilberto Freyre. $9\frac{1}{2}\times6\frac{1}{2}$. lxxii+ 538+xlvii pp. *New York: A. A. Knopf*, 1946. 35*s*

EXPEDICÃO Á REGIÃO CENTRO OCCIDENTAL DA BAHIA
By G. Simas Pereira. (*Rev. Brasil. Geogr.* 7 (1945) 573–620; sketch-maps and illustrations)

THE DISTRIBUTION OF INDIANS AND INDIAN LANGUAGES IN PERU
By J. H. Rowe. (*Geogr. Rev.* 37 (1947) 202–15; sketch-maps)

AUSTRALASIA AND PACIFIC

BROKEN HILL TO-DAY
By G. Farwell. (*Walkabout*, 13 (1946) 9–16; illustrations)

DARWIN: Australia plans a tropical city
By M. K. Woodburn. (*Walkabout*, 13 (1947) No. 7, 6–14; plans)

AN OUTLINE OF LATE CRETACEOUS AND TERTIARY DIASTROPHISM IN NEW ZEALAND
By E. O. Macpherson. (*N.Z. Geol. Mem.* 6 (1946) 32 pp.; maps)

REVIVAL OF MAJOR FAULTING IN NEW ZEALAND
By C. A. Cotton. (*Geol. Mag.* 84 (1947) 79–88; illustrations)

ARCHÉOLOGIE DU PACIFIQUE-NORD
By A. Leroi-Gourhan. (*Trans. Inst. Ethnol., Paris*, 47 (1946) 542 pp.; maps and illustrations)

TRAIL OF THE MONEY BIRD
By Dillon Ripley. $8\frac{1}{2} \times 5$. xvi+336. Illustrations. *London: Longmans, Green*, 1947. 15*s*

The American edition of this account of a naturalist's voyage to the Pacific and New Guinea was reviewed in the *G.J.*, Dec. 1943

POLAR REGIONS

ARCTIC AIR TRANSPORT
By Trevor Lloyd (extr. fr. *Air Affairs*, Dec. 1946, 218–32)

L'OEUVRE SCIENTIFIQUE ET LES REALISATIONS ECONOMIQUES DANS L'ARCTIQUE SOVIÉTIQUE
By P. George. (*Cahiers el'Etudes soviétiques, Paris*, No. 1 (1946) 56 pp.; sketch-maps)

GREENLAND: an experiment in human ecology
By M. J. Dunbar. (Extr. fr. *Commerce Journ. Toronto*, Mar. 1947, 69–109; sketch-map)

THE EXPLORATION OF ANTARCTICA
By Brian Roberts. (*Nature*, 159 (1947) 388–92)

Summarizes the work of recent expeditions

THE FALKLAND ISLANDS DEPENDENCIES SURVEY, 1943–46
By J. M. Wordie. (*Polar Record*, 4 (1947) 372–84; map and illustrations)

EDWARD BRANSFIELD'S ANTARCTIC VOYAGE, 1819–20, AND THE DISCOVERY OF THE ANTARCTIC CONTINENT. (*Polar Record*, 4 (1947) 385–93)

Reprints the original documents on this voyage

ATLASES AND MAPS

WORLD

ADMIRALTY CHARTS. 14 New Charts; 21 New Editions of Charts; 50 Charts that have received Large Corrections; 32 "Decca" Lattice Charts. *London: Hydrographic Department, Admiralty*, 1946–47

World Crude Oil Production and Refining Capacity. 1 : 41,000,000. *London: Petroleum Information Bureau*, 1947

EUROPE

EUROPE. Europa 1 : 5,000,000. By E. Romer *Wroclaw: Książnica-Atlas*, 1947

EIRE. Ordnance Survey. 6-inch sheet Tipperary 31 and 31A. *Dublin: Ordnance Survey Department*, 1947

FRANCE. Carte de France au 50,000*e*. 8 sheets; Carte de France et des Frontières au 200,000*e*. 3 sheets. *Paris: Institut Géographique National*, 1946

GREAT BRITAIN. New Popular Edition One-Inch Map of England and Wales. Sheets: 97, 98, 99, 104, 106, 114, 115, 120, 127, 128, 131, 140, 141, 142, 154.—Scotland One-Inch Popular Edition. Sheets: 29, 31. *Chessington: Ordnance Survey*, 1947

GREAT BRITAIN. Ordnance Survey 1 : 25,000 or about $2\frac{1}{2}$ inches to 1 mile. Provisional Edition. 82 sheets. *Chessington: Ordnance Survey*, 1947

The areas covered are mainly in Lancashire, Yorkshire, and East Anglia.

ITALY. Atlante Fisico Economico d'Italia di Giotto Dainelli. *Milan: Consociazione Turistica Italiano*, 1940

POLAND. Polska Mapa Fizyczna. By E. Romer and W. Migacz. 1 : 2,500,000 and 1 : 800,000. *Wroclaw: Książnica-Atlas*, 1947

SWITZERLAND. Wirtschaftsgeographische Karte der Schweiz von Hans Carol. 1 : 300,000. *Berne: Kümmerly and Frey A.G.*, 1946

AMERICA

CANADA. National Topographic Series, 1 : 63,360 5 sheets; 1 : 126,720 4 sheets; 1 : 253,440 6 sheets; 1 : 506,880 1 sheet. *Ottawa: Department of Mines and Resources*, 1946–47

ARGENTINA. Carta Aeronáutica al 1 : 1,000,000. Sheets: 1 to 6, 9/10, 15. *Buenos Aires: Instituto Geográfico Militar*, 1946

AUSTRALASIA

AUSTRALIA 1 : 5,000,000. *Edinburgh: John Bartholomew & Son, Ltd.* [1945] 4*s*

AUSTRALIA 1 : 506,880. 62 sheets; 1 : 253,440 218 sheets; 1 : 63,360 374 sheets. *Melbourne: Survey Directorate, Commonwealth of Australia*, 1939–46

NEW ZEALAND 1 : 63,360. North Island, 71 sheets; South Island, 86 sheets. *Wellington: Department of Lands and Survey*, 1942–45

THE SOCIETY'S NEWS

PLANS FOR AN EXPEDITION TO WESTERN QUEEN MAUD LAND

At the invitation of the Norwegian Geographical Society, a meeting of British, Norwegian, and Swedish representatives, under the Chairmanship of Dr. Sverre Petterssen of the Norwegian Meteorological Institute, was held in Oslo on 8 and 9 July 1947 to discuss provisional plans for a combined scientific expedition to western Queen Maud Land in the Antarctic. The British representatives were Mr. L. P. Kirwan, Director of the Royal Geographical Society, the Reverend W. L. S. Fleming, Director of the Scott Polar Research Institute, and Squadron Leader J. F. Davis of the Directorate of Navigation, Air Ministry. The Swedish representative was Professor Hans W:son Ahlmann of Stockholm University. In addition to Dr. Petterssen, the Norwegian representatives were Mr. Bernt Balchen, Mr. Thv. Einang of the Ministry of Commerce, Professor O. Holtedahl, Director of the Geological Institute, Major N. Joerstad, Commodore F. Lützow-Holm, General H. Riiser-Larsen, and Professor W. Werenskjold, Director of the Geographical Institute.

The area to be explored is one which promises to yield most valuable results in glaciology, meteorology, and geology and the main object of the expedition will be to undertake research in these sciences. An important feature of the programme and one of special interest to Norway will be an aerial survey of the region. This part of the Antarctic has never been examined from the ground, but aerial photographs taken in 1938–39 show large areas surprisingly free of ice and snow and surrounded by inland ice.

The territory offers excellent prospects for new and important scientific discoveries bearing on recent climatic changes in the Antarctic Continent and their relationship with changes now taking place in the Arctic. It is in fact a key area for the study of polar climatic history. It is intended that the expedition should set up a meteorological station in this remote region. This would work in conjunction with a network of similar stations stretching from Pole to Pole, and should produce results of the first importance for general weather forecasting over a wide area.

The geological programme will aim at elucidating the structure and past history of the Antarctic and establishing the relationship between the geology of the Antarctic and that of neighbouring continents, especially Africa.

The expedition will be led by General Riiser-Larsen. The conference hoped that the Norwegian ship *Svalbard* might be available to transport the expedition to the Antarctic in the late autumn of 1948 and that two Catalina aircraft and a Fiesler Storch would be carried in the ship for aerial survey and for landing the wintering party on the inland ice about 200 kilometres from the coast. It is intended that the wintering party should number about fourteen men, drawn from the participating nations and remaining in the Antarctic throughout one year.

AWARD OF SOCIETY'S TRAVELLING FELLOWSHIP

On the recommendation of the selection committee, the Society's travelling Fellowship in geographical research for 1947–48 has been awarded to Mr. C. A. Fisher, Lecturer in Geography at University College of Wales, Aberystwyth, for work on certain aspects of the historical and political geography of Malaysia with particular regard to the nature, growth, and interaction of native states in

Malaya and Indonesia. Mr. Fisher is a graduate of Cambridge University where he obtained first class honours in geography in 1938. He was subsequently Junior Librarian of St. Catharine's College, Cambridge, and Bartle Frere Exhibitioner in the University. During the war Mr. Fisher had six years' military service, three of which he spent as prisoner of war in Malaya and Thailand. It was while serving with Malaya Command and as a prisoner that Mr. Fisher began his present researches. After a short appointment to University College, Leicester, Mr. Fisher went to University College of Wales as Assistant Lecturer in 1946, becoming Lecturer in Geography in 1947. As already announced in the *Journal* (108 (1946) 259), the Fellowship has been made possible through the generosity of the Trustees of the Geographical Magazine Trust. The results of Mr. Fisher's research will be communicated to the Society.

EXHIBITIONS IN THE NEW SESSION

The Society is planning two exhibitions to be held in the 1947–48 session. The first, which will provisionally run from December 22 to January 12, will demonstrate the development and planning of British Civil Air Routes. At Easter the Society, in conjunction with the Institute of Navigation, will hold an exhibition to illustrate the history and development of navigational methods and instruments from early times to the latest inventions in electronics and other aids developed during and since the war.

THE SOCIETY'S COLLECTION OF PHOTOGRAPHS

The calls for teaching and reproduction purposes on the Society's collection of photographs of foreign countries have greatly increased in recent months. The collection has been built up very largely through the generosity of Fellows, and any further contributions of photographs, titled where possible, would be most welcome.

STAFF APPOINTMENT

Miss Jean Fortt has recently joined the permanent staff of the Society as assistant to the Director. During the war Miss Fortt worked at 10, Downing Street as secretary to Sir Desmond Morton, Mr. Churchill's Personal Assistant. Miss Fortt is a graduate in geography of Birkbeck College, University of London, and took second-class honours in 1946.

THE MONTHLY RECORD

RESEARCH FELLOWSHIPS FOR WORK IN THE NORTH AMERICAN ARCTIC

The Arctic Institute of North America is offering two Research Fellowships of $2000 each for scientific work in the North American Arctic and Subarctic during 1948. Research must include field investigations either in Alaska, northern Canada, Labrador, Newfoundland, or Greenland. The Fellowships are open to any one who has demonstrated his ability to carry out research work of superior quality in some field of science. The Fellowships will be awarded on the recommendation of the Board of Governors of the Arctic Institute and will be announced by March 1948. Applications must be received by 1 November

1947. Application forms may be obtained from The Arctic Institute of North America, 805 Sherbrooke Street West, Montreal, Canada.

The 1947 Fellowships, announced in the *Journal* for March–April 1946, were awarded as follows: one was awarded to Dr. Ilmari Hustich of the University of Helsinki for botanical and forestry investigations along the east coast of Hudson Bay; the other was divided between Dr. Jacques Rousseau of Montreal for botanical work on Ungava peninsula and Dr. R. D. Slobodin of New York for ethnographical investigations in the vicinity of Fort McPherson on the Mackenzie River.

PACIFIC WAR MEMORIAL

A scientific foundation known as the Pacific War Memorial has been established in New York to organize and support research in the Pacific in memory of those who lost their lives in the Pacific theatre of war. As a first step, it is proposed to set up two Research Field Stations on the island of Saipan and on Koror, an island in the Paulau group near Peleliu. Fields of investigation will include public health and medicine; education and social development including anthropology, economics and labour; agriculture and fisheries; oceanography and meteorology; and plant, zoological, and earth sciences. A programme to conserve the scientific resources of the Pacific will be inaugurated as the first essential in making these investigations possible. The Pacific War Memorial hopes eventually to establish field stations and conservation areas in cooperation with scientists of other countries on Pacific islands outside American jurisdiction.

COURSE IN PHOTOGRAMMETRY AT ZURICH

After an interruption of eleven years the Swiss Federal Institute of Technology is again giving a course in photogrammetry in March and April 1948. The course will be directed by Professor Max Zeller, Director of the Institute of Photogrammetry of the Federal Institute, who will himself give the lectures with the assistance of Dr. A. Brandenberger, Professor F. Bäschlin, and others. The lectures will be based on Professor Zeller's 'Manual of photogrammetry' (Zurich, 1947) and will be delivered in French with some lectures in English and German. As in previous years the Institute will put its fine collection of instruments and equipment at the disposal of those taking the course.

The course will be in two parts. Part one, from March 1 to March 27, will be a thorough introduction to photogrammetry with special attention to aerial photogrammetry, and will largely consist of demonstrations and exercises in the use of instruments. Visits to the Federal Survey Department at Dübendorf and to the works of the Henri Wild Survey Instrument Company at Heerbrugg will be included. Part two, from March 28 to April 30, will provide more advanced theoretical and practical instruction in all branches of photogrammetry and will include lectures on the planning of survey flights, the computation of aerial triangulation, the theory of errors, and the results of the latest research.

The fees for the course will be 200 *fr.* Swiss for the first part and 300 *fr.* Swiss for the second part. Applications should be addressed to the Director, Institute of Photogrammetry, Swiss Federal Institute of Technology, Zurich, and should state whether lectures are desired in French, English, or German.

ORDNANCE SURVEY GAZETTEER WITH NATIONAL GRID REFERENCES

The Ordnance Survey have published a 'Gazetteer of Great Britain' (Chessington, 1947, 5s) "in terms of the National Grid." It is in two parts, England and Wales, containing about 12,000 towns and important villages, and Scotland

with about 1000 names. For each entry a national grid reference to the 10-km. digit is given, in the form, *e.g.* Bristol 31/57. The first number indicates the south-west corner of the 100-km. square of the grid within which Bristol lies, and the second number indicates similarly the position of the 10-km. square, in this case 50 km. east and 70 km. north from the south-west corner of the larger square. By locating this reference on the index diagram accompanying the Gazetteer, the number of the relevant sheet of the New Popular One Inch or the Quarter Inch can be obtained, and the 10-km. square located thereon. On the One Inch map, the place being sought will lie within a square with sides of 6·2 inches. The numbers of the One Inch sheets might have been given with the entries in the Gazetteer, thus reducing the need for referring to the index diagram, but these were no doubt omitted to avoid possible confusion with the numbers of the 100-km. squares. One advantage of the grid reference employed is that it is also the number of the sheet in the new Two-and-a-Half Inch Series on which the particular place is to be found, *i.e.* Bristol is on sheet 31/57.

THE INDIAN ECOLOGIST

Number 1, Volume 1 of the *Indian Ecologist*, dated April 1946, appeared towards the end of last year. It is edited for the Indian Ecological Society by Dr. F. R. Bharucha, and the format adopted is similar to that of our own *Journal of Ecology*. Apart from the work of the Botanical Survey of India, which has not been very active for some years, Indian botanists have scarcely touched the fringe of the vast field of ecological studies which await investigation, and the new Journal is worthy of wide support.

The first number includes a very instructive paper on "The micro-climates of plant communities," by L. A. Ramdas, which deals with temperature variations within the zone close to the ground in which various typical Indian crops normally grow. There is a brief note on the "Ecological aspect of contour strip-cropping," by J. K. Basu and L. Sreenivas, and a useful preliminary study by R. Misra of Benares University on the "Ecology of low-lying lands." The Journal embraces also animal ecology, and P. G. Deoras contributes a note on the ecology of Caddis flies. Economic aspects are represented by A. K. Malik's note on "Drought resistance of sugar cane."

The Journal is issued from the Royal Institute of Science, Bombay.

BIBLIOGRAPHIE GÉOGRAPHIQUE INTERNATIONALE, 1940–44

The Association des Géographes français has now published the 'Bibliographie géographique internationale' covering in one volume the years 1940–44. During the war years, the editor, M. Elicio Colin, continued to collect material despite many difficulties: though a few European countries are not covered and it has not been possible to provide the usual proportion of summaries, the character of the work has been well maintained with the support of several geographical societies. The volume contains more than two thousand main headings, some including as many as twenty bibliographical items.

By arrangement with the Association, the Society will shortly be distributing copies in Great Britain at a special price. The price of this volume has been fixed at fifteen shillings post free, a considerable reduction on the ordinary published price. Orders should be addressed to the Office at the House of the Society. Copies of earlier volumes are still obtainable at various prices.

GEOGRAPHICAL LITERATURE OF NEW ZEALAND

New Zealand is a small country but the literature about it is voluminous. The grandeur of its scenery, the striking characteristics of its landforms, the beauty

of its vegetation and bird life, and the romance of settlement in these southern islands have all had their enthusiastic exponents. For those objective expositions of the country's character which provide information of geographical value, one must rely mainly on the writings of natural scientists to whom has fallen the task of studying the Dominion's geography in the absence, until quite recently, of professional geographers.

For information prior to the present century the writings of the early scientists are invaluable. Hochstetter, Dieffenbach, von Haast, and others have left us records of their observations written in the systematic, descriptive tradition of Humboldt. Hochstetter's 'New Zealand; its physical geography, geology, and natural history,' first published in German in 1865 and in an English translation in 1867, constitutes a major contribution to New Zealand geographical literature. It is essentially a geologist's account of a tour of the country, but the author does not allow his professional interests to outweigh his observations on relief forms, on the vegetation, the life and customs of the inhabitants, and the character of settlement. In similar vein is Dieffenbach's 'Travels in New Zealand.' At the same time one can glean a good deal of material on early New Zealand from less academic works, such as Wakefield's 'Adventure in New Zealand,' and from the accounts left by some of the early runholders, of which Lady Barker's 'Station life in New Zealand' and Samuel Butler's 'A first year in the Canterbury settlement' are examples.

The only full length book yet published to bear the title 'The Geography of New Zealand' is the work of Dr. Patrick Marshall, the geologist. It appeared about 1905 (no date of publication is given on the title page) and represents the last of the major works by scientists in the tradition of Humboldt. It is a compendium of information, at least half of which is devoted to a systematic study of the physical features of the land; the remainder of the book covers a wide range of subjects including Water Supply, Manufactures, Transport and Communications, Government, Education and Religion, and Taxation and the National Debt. Marshall's book is of special interest in the story of New Zealand geography because it set the pattern for geographical inquiry in schools for some thirty years after its appearance and it confirmed the already widely held view that the teaching and examining of geography should be in the hands of those trained principally in geology. The strong physical bias in New Zealand geography may be traced partly to the influence of Marshall and of some of his contemporaries like Hogben, who strongly emphasized mathematical geography, and partly to the fact that it was left to geologists in general to undertake the development of geography because others did not come forward to assume the burden.

It is not surprising therefore that most twentieth-century academic contributions to New Zealand geographical literature have come from those trained in the natural sciences, particularly geology, botany, and meteorology. Among geologists the work of Professor C. A. Cotton constitutes a major contribution to our understanding of New Zealand landscapes. Apart from his many papers published in the *Transactions and Proceedings of the Royal Society of New Zealand*, the *New Zealand Journal of Science and Technology*, and various journals abroad, he has contributed four books of outstanding merit. Part I of his 'Geomorphology of New Zealand,' published in 1922, has been extensively revised and republished under the title 'Geomorphology.' The promised sequel of a regional geomorphology of the country has, unfortunately, never appeared but the elementary analyses of landscape forms contained in 'Geomorphology' have been extended in three recent publications, namely, 'Landscape, as developed by the processes of normal erosion,' 'Climatic accidents,' and

'Volcanoes as landscape forms.' These clear and scholarly books and papers by Professor Cotton represent the investigations of a geologist whose continuous interest in geography has led him to concentrate mainly on the interpretation of landforms as they exist at the present time. His papers provide us with the geomorphology of many parts of the country, especially Wellington and Marlborough, and his books apply general principles to the New Zealand scene.

Among contributions of other geologists, special mention should be made of the work of W. N. Benson whose various papers on Otago are the chief source of information for the landforms of southern New Zealand, and of the bulletins of the New Zealand Geological Survey (new series), in the introductory pages of which are short topographical accounts of many parts of the country.

To botanists the name of Dr. L. Cockayne is well known. In 'The vegetation of New Zealand,' published in Leipzig in 1928, Cockayne provides a study of New Zealand vegetation which is still a standard work, although recent investigations have led some botanists to question his conclusions. While his approach is explanatory, he presents his material partly in regional form. Much of the natural vegetation which Cockayne describes has been replaced by the grasslands upon which New Zealand's economy is based. To obtain a true picture of the present vegetation his book should be read in conjunction with two recent bulletins of the Department of Scientific and Industrial Research: Bulletin 47 by F. W. Hilgendorf on "The grasslands of the South Island," and Bulletin 79 by E. A. Madden, "The grasslands of the North Island of New Zealand." Other sources are the *New Zealand Journal of Science and Technology*, the *New Zealand Journal of Agriculture*, and the bulletins published by the Department of Scientific and Industrial Research. These contain numerous articles on grassland and vegetation topics generally; especially useful are those of A. H. Cockayne, V. D. Zotov, E. Bruce Levy, and H. H. Allen. One might mention also the *Proceedings of the New Zealand Grassland Association* which contain much material relevant to the agricultural geography of the Dominion.

Practically all the published material on New Zealand climate which is of geographical value is the work of the late Edward Kidson although there have been a number of recent articles by C. J. Seelye. They have appeared almost exclusively in the *New Zealand Journal of Science and Technology*, where one can find nearly all Kidson's work on New Zealand, published from about 1930 onwards. The results of much of his work have been incorporated in the general treatise entitled "The climate of New Zealand" which he prepared for the great 'Handbuch der Klimatologie.' Kidson was primarily a meteorologist and his contributions lie mainly in that field. To the geographer his work is chiefly valuable for its use of maps as a medium of expression. It thus makes possible a fair representation and explanation of the distribution of the country's various climatic phenomena, though a composite picture of the New Zealand climate, especially in terms of its regional variety, is not so readily obtained.

The importance to geography of the work of those interested in the various branches of the social sciences must not be overlooked. Condliffe and Belshaw in the economic sphere and Elsdon Best in the field of anthropology have carried out researches necessary to modern geographical work. Best's two-volume account of 'The Maori' and his shorter study of 'The Maori as he was,' and Condliffe's 'New Zealand in the making,' provide those reconstructions of stages in the country's evolution which are necessary to the full understanding of the present day scene.

Most of the large number of books about New Zealand written primarily for the general reader are too general or too coloured by romance to be of geographical value. Nevertheless the student of New Zealand geography will find

a good deal of useful material in such books as Guthrie Smith's 'Tutira: the story of a New Zealand sheep station,' John Pascoe's 'Unclimbed New Zealand,' R. M. Burdon's 'High country,' L. G. D. Acland's compilation from early records entitled 'The early Canterbury runs,' and Oliver Duff's 'New Zealand now.' 'Tutira' is particularly valuable. The author presents a penetrating study of land development in the high country of Hawke's Bay, in which one finds not only statistical and factual material about a station which is typical for a wide area but also revealing accounts of such practices as burning and extensive stocking which have produced the problem of soil erosion.

A note in the *Geographical Journal* for January–February 1946 (vol. 107, p. 75) draws attention to the absence of any facilities for the study of geography beyond stage one of the B.A. degree before 1937 when the first university department of geography was established at Canterbury University College, and to the fact that other university departments were established only in February 1946. It is not surprising then that the output of geographical literature by professional geographers is small. Before 1940 articles such as R. O. Buchanan's "Hydro-electric power development in New Zealand" in the *Geographical Journal* (75 (1930) 444–61) and the same writer's "The pastoral industries of New Zealand" in the Publications of the Institute of British Geographers (No. 2, 1935) were rare. The establishment of advanced work in the Dominion has already altered this position. Among recent articles by geographers working in New Zealand those by Kenneth B. Cumberland in the *Geographical Review* between 1940 and 1944 are especially notable. The same author has now produced a full length book, 'Soil erosion in New Zealand' which, in all but name, can be regarded as the first geography of New Zealand written since that by Patrick Marshall.

Until recently the greatest obstacle to geographical literature was the lack of a suitable medium in the Dominion. The *Transactions of the Royal Society of New Zealand* concentrates mainly on the researches of botanists, zoologists, and geologists and the *New Zealand Journal of Science and Technology* is specifically for studies in the natural sciences. It is significant that most of Cumberland's more important papers have been published abroad and his researches have therefore not had the wide publicity in New Zealand which they deserve. This need has been met by the appearance of the *New Zealand Geographer* which has been published twice yearly since April 1945. It has made possible an increased output of geographical literature about the country and offers a ready medium of publication to those working in New Zealand. Already several articles have appeared which might otherwise have been sent abroad or not have been published at all.

Most of the books and papers mentioned here and many more not specifically referred to have all been written primarily from the viewpoint of the systematic science in which each author is interested. The regional viewpoint, which is the core of geographical work, is hardly represented. Indeed, purists may question whether some of the material noted here can be classed as geography at all. The absence of studies in human geography is remarkable. The geographies of settlement and manufacturing industry, for instance, have hardly been touched, although a start has been made by the appearance of two articles in the *New Zealand Geographer*, J. L. Hewland's "Manufacturing in New Zealand, its outstanding characteristics" and Frederick Parks' "Land utilisation in metropolitan Christchurch."

In conclusion, it requires stressing that there is in New Zealand a mass of material waiting for geographers to use. Many of the publications which have been mentioned provide for geographers little more than the basis for further study. A vast amount of synthesizing and relating of material remains to be

done before the researches of geologists, botanists, meteorologists, agriculturalists, and economists can be given full geographic interpretation. Moreover, in various government offices, particularly the Meteorological Office and offices connected with the Department of Scientific and Industrial Research, there lies a wealth of information which is stagnating for want of persons with some geographic training to sort it and give it meaning in terms of the country's regional character. Here is opportunity for pioneers. B. J. GARNIER.

PRESENT TRENDS OF SOVIET GEOGRAPHICAL THOUGHT

An article by N. N. Baranski on "Regional, economic, and physical geography" in the *Izvestiya* of the All Union Geographical Society (78 (1946) 9–24) throws some interesting light on the present trend of Soviet geographical thought and on practical difficulties of research. After pointing out the defects of the older type of general geographies and the differentiation and specialization which have occurred in the several branches of geography, the writer stresses the importance of a general synthesis—difficult but not impossible to achieve. As regards cooperation between the relevant sciences, he remarks that the importance of this is recognized in theory, as in the organization of large-scale expeditions, but is rarely achieved in practice. He then proposes to examine the effects of this specialization on geography and the evolution of geographical work.

As regards the two main branches of geography, "I am obliged to state that physical and economic geography in our own country are, to an extremely high degree, disconnected, much more markedly than in any other country, or than they were in our own country in the past." This severance he attributes to the reaction in 1929–34 by physical geographers against "geographical determinism," leading to attacks on discussions dealing with "the influence of natural conditions on economy, or even with the correlation between nature and economy." Having killed the old anthropography, they had nothing to put in its place: "the human element had been forgotten." The human element however cannot be relegated to ethnography, and he cites southern Kasakstan and "the contrasting methods of farming of Cossaks and Russians, Usbeks and Dungans, Ukrainians and Koreans, while living side by side."

As a result, institutions such as the Academy and the Institute of Foreign Trade, the new Institute of Foreign Relations, and military academies cannot obtain a wide knowledge of a particular country on a regional basis: "they devote much of their time to this purpose, inviting physical and economic geographers, but not obtaining the desired knowledge from them, and remaining definitely dissatisfied, owing to the fact that we lack the appropriate lecturers and the necessary literature for the general knowledge of foreign countries." These audiences do not require physical geographers or economic geographers; they want regional specialists.

The writer considers that neither physical nor economic geographers can meet this demand, and urges the training of "regional historians" to work out the functional links between nature and economy: this would include, in addition to geography, economics, and ethnography, the study of philosophy, politics, and history, and a fluent knowledge of the necessary language. The countries to be studied "should primarily include those which are most important to us, for example, (1) The United States, (2) Britain, (3) China, (4) the group of Slav countries, (5) the Near and Middle East (Turkey, Iran, Irak, Afghanistan)." The reconstructed regional sections of faculties of geography should train students as teachers of this "regional history" in higher educational institutions, and should produce regional monographs. "Being given a paper on the general characteristics of a given country, students enumerate instead its different

peculiarities. In suggesting to a student that he should compile even a few sentences on that country as a whole, you would place him in a considerable predicament."

The writer recognizes that the training of these "regional historians" will take a number of years, and that they will have to venture far beyond the limits of geography. He foresees ultimately the "conversion of the appropriate chairs of regional history into American, Chinese, Slav, and other Institutes," possibly detached from the geographical faculties. The regional histories eventually produced would be far from resembling the uncoordinated material of gazetteers. The features emphasized in the study of each country must be distinctive and essential and correlated with those of other countries. The work of creating and developing the new study will be heavy. The first essential will be to collect all the relevant literature in one place. From his own experience the writer has found that the literature on the United States, for example, available in Moscow is scattered among "libraries of the most varied kind, and without any system whatever in its distribution." After several years' study of the material, the specialist should visit the particular country to verify and check his conclusions. Finally the writer states that while the main scientific branches have their own special publications, geography has not, as regards "scientific and fundamental works on a series of capitalist countries or regions of the U.S.S.R." Therefore, "In his wanderings amongst publications not his own, the geographer is obliged to converse with persons knowing and understanding nothing about geography and not having that subject at heart." An editorial note to this states that the Geographical State Publication was organized in 1945 in Moscow shortly after this article was received.

TOWARDS A WORLD SYSTEM OF AIR NAVIGATION

Mr. Francis Chichester, representative of the Guild of Air Pilots and Air Navigators of the British Empire in the Provisional Civil Aviation Organization, sends us the following review of British and American systems of air navigation. Mr. Chichester was one of the British delegates to the recent air demonstrations arranged by the Governments of Great Britain and the United States:

All that Britain and the U.S. could offer in Radio Aids to Civil Air Navigation were seen and sampled by the delegates of some thirty-three nations to the demonstrations held in London and Washington in September and October 1946. These aids fit roughly into four classes: (1) long distance, (2) medium and short range (approach), (3) landing, and (4) control of aircraft on the ground. Accidents and difficulties of civil navigation are due chiefly to present lack of approach and blind landing aids (2 and 3); therefore only these will be discussed here.

There was a sharp difference of opinion between the British and American delegates as to the best form of approach aids. The British wanted to use Gee with its graticule of varying hyperbolic position lines; these position lines are identified by the time difference in the arrival at the aircraft of two radar pulses emitted from two separate ground transmitters. The Americans favoured the spider-web graticule of position lines. The radius of the spider-web is derived from the bearing from an omni-directional beacon; the concentric circle position line of the spider-web is identified by the lapse of time between the emission of a pulse from the aircraft and the return of an echo pulse from a ground beacon.

Gee has the advantages of accuracy to several hundred yards, a good range of 250 miles, and a particular advantage for the British in that they have an existing stock of airborne instruments and ground stations. Gee has these disadvantages:

(1) it requires a separate operator who must direct the pilot from a "back seat" (it will be re-designed so that the pilot can work it, but even then will require too much thought for the pilot to set it up and use it efficiently); (2) the graticule of position lines is different for every airfield, which makes it difficult for ground controllers to direct a strange or foreign pilot as to what pattern he shall fly; (3) the ground stations are difficult to site and costly to maintain (one reason for the cost is that they are sited at a distance from airfields); and (4) a different map is required for each airfield.

The spider-web system with the instruments at present available has these advantages: (1) it is pilot-operated and easy to use; (2) it constantly provides the bearing and distance from the airfield to which the aircraft is going; (3) the graticule is the same for every ground station and therefore the pattern of approach can be the same for every airfield (this reduces the chance of a strange pilot misunderstanding the ground controller); (4) the ground stations are sited at airfields and therefore comparatively cheap to maintain. The spider-web system has the disadvantage of an accuracy much inferior to that of Gee, but this does not diminish its value for near approach navigation.

The writer has stressed the relative merits of the hyperbolic and spider-web systems because he thinks the spider-web is the better and that the British user should demand immediate research and development to improve its accuracy instead of trying to force the use of the hyperbolic system because the equipment for it happens to be available to-day. Because the spider-web system is simple to understand and is uniform in pattern for every airfield, its universal use would be, in the writer's opinion, a major factor in the prevention of air accidents.

For instrument (blind) landing the difference of opinion is not between the British and the American systems, but between the pilot who has used Signal Corps system 51 or Standard Beam Approach and the pilot who has used Ground Control Approach: each thinks the system he has used is the better. But to achieve a landing rate of anything near one aircraft a minute, which will be essential when the traffic density increases, both systems must be used in conjunction. The principle of the S.C.S. 51 is for the aircraft to follow the approach path formed by the overlap of two radio beams. At the same time a glide path is formed by the overlap of two similar beams in a vertical plane. The pilot reaches the end of the runway if he keeps to both the glide path and the approach path. With this system the navigation is done in the aircraft.

With G.C.A. a horizontal radar scanner keeps the ground controller informed of the aircraft's position, while a vertical scanner gives him the aircraft's elevation and distance. Thus the ground controller can direct the aircraft to keep on both the approach path and the glide path to the runway or, as it is called, "talk it down." With this system the ground controller does the navigation.

To land at the rate of one a minute, the aircraft must be approaching down the glide path at 2-mile intervals. The writer suggests that while the pilot using his S.C.S. 51 instruments can keep to the glide path, the G.C.A. ground controller can watch for any straying from the path or danger of overtaking. The G.C.A. could not handle all the traffic because there would be too much talk in the air, while S.C.S. 51 alone could not prevent overtaking and the consequent danger of collision. The two must be used in conjunction.

EXTENT OF THE PACIFIC OCEAN

In Sir Joseph Dalton Hooker's 'Journal of the Right Hon. Sir Joseph Banks' (London, 1896) the following entry appears under the date 11 March 1769: "A steady breeze had blown during the last three days, and there was no sea at all;

from whence we concluded that we had passed the line drawn between the Great South Sea and the Pacific Ocean by the Council of the Royal Society; notwithstanding we are not yet within the tropics."

The staff of the Royal Society, unable themselves to find any record of the line, most courteously allowed me to examine the minutes of meetings of the Council held during the period of preparation for Cook's first voyage. The only references to limits which I was able to trace were not to those of the Pacific Ocean but to those of the area proper for the observation of the transit of Venus on 3 June 1769. They appear in the minutes for 15 February, 9 June, and 23 June 1768. On 9 June 1768 the Royal Society addressed a letter on the subject to the Secretary of the Admiralty. The name South Sea does not occur in the minutes for this period, "the pacifick Ocean" being that generally used.

In Burney's 'A chronological history of the discoveries in the South Sea or Pacific Ocean' (5 vols., London, 1803–17), a work dedicated to Sir Joseph Banks, the "line of boundary of the South Sea or Pacific Ocean" is defined in the first chapter, though Burney admitted that the application of these names in his time had "been extended far beyond every signification of the words which the most liberal construction can allow, and equally beyond the space for which they were originally intended, to limits which, within the last thirty years, remained undiscovered." In his discussion of Magellan's passage across the Pacific he wrote: "This name, Magalhanes and his companions could design only for the sea within the mild latitudes: for from the strait they at first 'navigated with great storms (*con gran tormenta*) till December the 18th, when they found themselves in latitude 32° 20′ South.' So tempestuous a sample of climate could not entitle the higher latitudes to be comprehended under the appellation Pacific."

Several authorities have discussed the history of the names of the oceans (*see* Rept. Sci. Results, Voy. of H.M.S. *Challenger*, 1872–76, Summary, I, London, 1895, pp. 72 ff.), and modern British usage seems to have been settled by a commission of the Royal Geographical Society in 1845 (*Geogr. J.* 1 (1893) 535–36). Several members of the commission were as dissatisfied as was Burney with the application of some of the names in use, but they thought it better to adhere to established practice than to introduce new names or new conceptions of regional limits. Schott has recently suggested a regional scheme for the geographical treatment of the oceans (*Petermanns M.* 82 (1936) 165–70 and 218–22, Taf. 24), in which Magellan's Pacific Ocean would apparently be the equivalent of Schott's Galapagos Region. The need for such refinement as Schott suggests is enough to revive interest in the Royal Society's old effort to distinguish between the Pacific Ocean and the South Sea; and it is to be hoped that some record of the line to which Banks referred will come to light. M. A.

THE PIZIGANO CHART AND THE "PILLARS OF HERCULES"

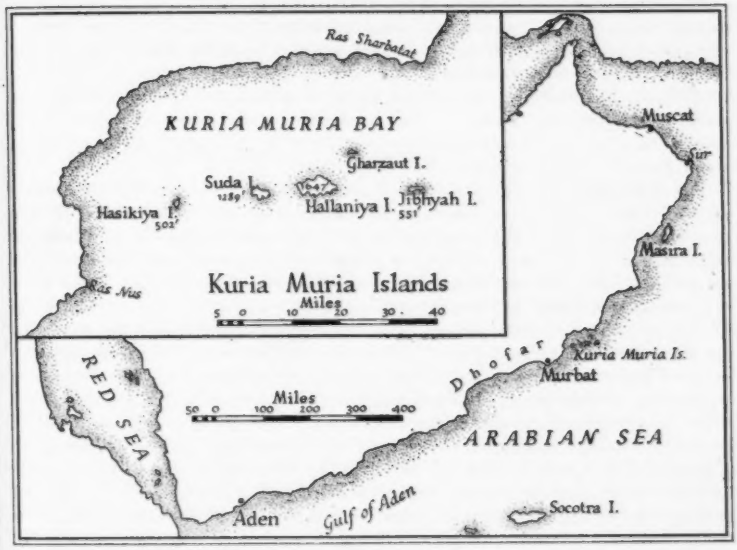
The significance of an inscription on the Pizigano chart of 1363 and its possible connection with the origin of the word "Antillia" have received attention from time to time without a generally accepted solution having been reached. Dr. R. Hennig has recently suggested an interpretation which deserves consideration (*Mitt. Geogr. Ges. Wien*, 88 (1945) 53–6). On the western margin of the chart is an inscription referring to "statues" marking the extreme limits of navigation, the position of which is indicated by a phrase which has been variously deciphered. Kretschmer read it as "ante ripas Atulliae" or "Antullia" and considered this the origin of the word Antillia, applied in the following century to an island, probably mythical, in the western ocean, but did not suggest an interpretation of the legend. The present writer pointed out in a

paper in this *Journal* (vol. 91 (1938) 260–2) that the inscription was based upon a legend common to medieval cosmographies to the effect that Hercules had set up two columns to mark the limits of his explorations on each side of the strait of Gibraltar. As this area was known as Getulia, the writer suggested that "Atulliae" was a copyist's error for "Getuliae" through a misreading of an ornamental capital G. Dr. Hennig observed the connection between the Pizigano inscription and the Hercules legend, and in seeking an explanation found that Wuttke had deciphered the phrase quoted above as "at temps A(r)cules." This strengthened his opinion of a connection with the Hercules legend, and he accordingly asked a medieval palaeographer, Dr. Giessler, for his reading of the phrase. He deciphered it as "ante templum Arculis." Dr. Hennig therefore considers the connection with Hercules established, and that the inscription can have no bearing upon the origin of "Antillia."

G. R. CRONE.

THE KURIA MURIA ISLANDS

Through the courtesy of the Naval authorities in the Persian Gulf I was able in April 1947 to pay a visit to the Kuria Muria Islands. These islands are situated off the south coast of Arabia and are a British possession, having been presented to his Majesty's Government by the Sultan of Muscat in 1854. How they came by their English name is not known; the Arabs call them the "Islands of Bin Ghalfan" after an Arab family who seized them in 1835.



The islands consist of little but bare granite and were valuable in the middle of last century only because of their guano deposits. These were exhausted by 1860 and since then the islands have been very rarely visited by Europeans. It is believed that earlier in this century De Montfried used them as a convenient depot for the hashish in which he trafficked between the Red Sea and India but there is no record to show when they were last visited officially. Nominally they

are part of the Aden Crown Colony but for administrative purposes they are under the control of the Political Resident in the Persian Gulf.

The islands are five in number. Four of them lie in a line running due east and west for some 50 miles. The fifth, Gharzaut, lies somewhat to the north of this line and consists only of a pinnacle of red granite and a gleaming white shelf which is presumably covered with guano.

We approached the islands from the west and came first to Haskiyah which is about a mile square and composed of light red granite faintly whitened by guano. It was here and at Jibliyah, the most easterly of the islands which has a very similar appearance, that the guano deposits were worked in the last century. These deposits were presumably the accumulation of thousands of years and from the sea they do not appear to have been built up again to any appreciable extent since the workings were abandoned. We saw no birds whatever on Haskiyah although it is reported to be the home of thousands of gannets; possibly it was not the right time of the year for them.

The next island, Suda, is about 12 miles from Haskiyah and the second largest in the group. We had been told that a woman and her four sons were living on it but although we cruised all round it we saw no sign of human habitation. The people of Hallaniyah later confirmed that it is uninhabited. It is 3 miles long and 2 miles broad and consists of one sugar-loaf hill of granite which rises to a height of 1300 feet. There are some bushes close to the shore on the south side of the island and there is said to be a well of brackish water.

The next island, Hallaniyah, 6 miles away to the east is the largest in the group, being more than 7 miles long and more than 3 miles broad. It is a complex mass of granite hills with a dark serrated ridge rising to 1500 feet near the eastern end and a magnificent red bluff at the north-western corner. This bluff forms one end of a bay which affords a sheltered anchorage during the south-west monsoon. There is a fair amount of rather brackish water on the island and a few bushes here and there close to the shore. In 1901 the island was reported, I think wrongly, to be uninhabited.

We approached the island at its north-east corner and some figures quickly appeared on a small beach. We at once went ashore and were greeted by two men and four boys. They were of poor physique and the boys were miserably thin. All wore their hair short and not long as is the custom amongst the Arabs on the neighbouring mainland. They talked Arabic but explained that their real language is Shihri which they said is the same as that spoken by the people of Murbat. They claimed affinity with these same people but were unable to say to what tribe they belonged. Murbat is a small port with a mixed population on the Dhofar coast nearly 100 miles distant from Hallaniyah. They said there were about seventy people on the island and that they had been there since time immemorial; the oldest man of the party who was about sixty said he had been born on the island and had always lived there. Practically their sole occupation is fishing. They own no boats of any kind but catch most of their fish in rectangular basket-traps which I understand are placed at considerable depths and retrieved by diving. Their main catch is the *safi*, a small black fish of which as many as a hundred may be caught in a trap at one time. These they dry and sell to the people of Murbat whose boats visit the island from time to time bringing millet, cloth, and the few other articles which are necessary for their extremely primitive mode of life. Boats from Masirah island also come at certain seasons of the year for the shark-fishing but otherwise they appear to have few visitors. The islanders own about fifty goats which we did not see; we were told they were in poor condition as there had been no rain for three years. We were however offered some milk.

After we had talked for some time we were taken to the village which was situated a few hundred yards away across a small ridge. It lies in a hollow amongst low ridges and is very difficult to see until you are close to it. It consists of about ten huts built of loose stones and roofed with all sorts of rubbish including fish-bones, seaweed, and odd bits of tin. There was one house much superior to the rest with a mud roof which we were told belonged to a merchant of Sur near Muscat who had gone off to Zanzibar with a cargo of dried fish, leaving his family on the island to await his return before the monsoon. The whole village appeared completely deserted and we were told that the inhabitants had all gone fishing or were living in booths elsewhere on the island, but I suspect that they had all fled to the hills with their moveable property being doubtful of our intentions. The party who had met us however showed no signs of fear. They posed for a photograph without a minute's hesitation, just as if they had done so many times before, and immediately on our arrival at the village one of the men produced some specimens of ore for our inspection. We spent about an hour on the island and before we left we gave the villagers some bread and cigarettes and a few Maria Theresa dollars which are the local currency. They begged us for sugar but unfortunately we had brought none with us.

The fauna of the island are described as wild-goats, whip-snakes, scorpions, and centipedes. We saw none of these except one scorpion but we made enquiries about the wild-goats. We were told that there are no ibex (*wa'al*) on the island but that "*dhabi*" are found. This is the word used elsewhere for the gazelle which is an animal of the plains and unlikely to be found on an island consisting entirely of crags and precipices. It is possible therefore that there may be some kind of short-horned wild-goat or wild-sheep on the island.

The last island, Jibliyah, is 16 miles east of Hallaniyah. We did not pass very close to it but from the distance it looks very much like Haskiyah and is about the same size.

RUPERT HAY.

THE INTERPRETATION OF GRANITE

Enormous areas of the hard parts of the earth's surface consist if not of granite then of granitic rocks, particularly of gneiss. Just how much of the whole surface of the earth is of granitic composition nobody can yet say (see Daly, 'Igneous rocks and their origin,' New York, 1914, pp. 42–6); but geologists agree that amongst the so-called igneous rocks granite holds a dominant position, and all who have examined geological maps are aware of the extent of the areas mapped as granite and gneiss.

The origin of the granitic rocks is one of the fundamental geological problems of our time and has been under particularly active discussion in English geological journals during the last decade. Some English geologists now wish to return to the classical interpretations of a century ago, to the ideas of Lyell and Hutton, and find in the observations of Clifton Ward and of nineteenth-century French geologists such as Elie de Beaumont a profounder interpretation of natural phenomena than that offered by the German school of microscopists who classified rock-specimens rather than rocks, or the American school of experimentalists who deal with simple silicate melts rather than with molten rock. Many British geologists have neglected the work of the French school and it is perhaps ironic justice that a French geologist should now produce an important monograph on granite while unaware of recent British work (E. Raguin, 'Géologie du granite,' Paris: Masson, 1946, 360 pp.). Professor Raguin's book, short though it is, manages through clarity of presentation and penetrating analysis to give a general account of our present knowledge of granite extending from consideration of the minerals of which granite is formed

to that of the radioactivity of the rock itself and its association with radioactive deposits. It should be read in conjunction with H. H. Read's "Meditations on granite" (*Proc. Geologists' Assn.* 54 (1943) 64–84, and 55 (1944) 45–93) and R. H. Rastall's "The granite problem" (*Geol. Mag.* 82 (1945) 19–30).

Raguin believes that the effects of contact-metamorphism commonly seen around small masses of granite differ from those of "granitization" (the production of granitic rocks by the regional metamorphism of great series of older rocks) only in degree, and he seeks a solution of the granite problem through an understanding of metamorphic processes at different depths within the earth's crust. The small mass of granite (or "batholith") surrounded by its aureole of slightly metamorphosed country rock represents the upper limit of processes which produce profound alteration in all formations at greater depth, particularly during periods of mountain-building. His conclusion converges towards that of Read, who now classes granite and the granitized formations together as Plutonic rocks. It is of great interest to note that Read and Raguin arrived at their conclusions independently. Raguin's monograph is copiously illustrated and, true to the principles of French geology, the commonest illustration is the example which he himself has seen. He is never far from the quarry face or the natural exposure.

Like the circulation of the ocean, the economy of the earth's crust is really an effect of thermodynamics. It is therefore somewhat surprising to find comparatively little attention given in the discussion of the granite problem to the question of the heat required for regional granitization and to that of the density and volume of minerals. More attention too might be given to the neglected field of South American illustration. Raguin's survey of our knowledge of granite makes it clear that much remains to be learnt about one of the commonest of rocks. M. A.

PALGRAVE IN ARABIA

Mr. H. StJ. B. Philby sends us the following note:

Fellows of the Society who heard my paper read at the meeting of 28 April 1919, may remember that I ventured to express serious doubts about the veracity of W. G. Palgrave and his claim to have travelled extensively in central Arabia. Dr. D. G. Hogarth very vigorously contested my challenge; and it is probable that, in the absence of sufficiently convincing evidence, the majority of those present as well as many others who have since studied the problem were satisfied that my case against Palgrave had not been made out. It was clear that more evidence was required to substantiate my view in the eyes of any impartial jury. Now, after nearly thirty years, I present that evidence.

Readers of Palgrave's entertaining volumes will remember that among the places he visited was the oasis of 'Uyun in the Qasim, where he found a great megalithic monument of which he gives us a very detailed description ('A year's journey through central and eastern Arabia,' 3rd ed. 1866, vol. I, p. 251). Huber and Leachman both visited 'Uyun and made no mention of any such monument, while I unfortunately had not been able to visit the place though I had passed close to it and had reasons for believing that no such monument existed. In summing up the case against Palgrave after my controversy with Dr. Hogarth ('The heart of Arabia,' vol. II, pp. 140–1) I selected this particular monument as the acid test of Palgrave's veracity: ". . . if it is found not to exist, the probabilities are that Palgrave never saw it and never saw 'Uyun; if, on the other hand, its existence can be established, there is every reason to believe that he did visit the locality. . . . A great deal, therefore, hangs on the question whether

the monoliths of 'Uyun exist or not, and that question must for the present be left open."

". . . we saw before us," says Palgrave, "several huge stones, like enormous boulders, placed endways perpendicularly on the soil, while some of them yet upheld similar masses laid transversely over their summit. They were arranged in a curve, once forming part, it would appear, of a large circle, and many other like fragments lay rolled on the ground at a moderate distance; the number of those still upright was, to speak by memory, eight or nine. Two, at about ten or twelve feet apart one from the other, and resembling huge gate-posts, yet bore their horizontal lintel, a long block laid across them; a few were deprived of their upper traverse, the rest supported each its head-piece in defiance of time and of the more destructive efforts of man. So nicely balanced did one of these cross-bars appear, that in hope it might prove a rocking-stone, I guided my camel right under it, and then stretching up my riding-stick at arm's-length could just manage to touch and push it, but it did not stir. Meanwhile the respective heights of camel, rider, and stick . . . would place the stone . . . full fifteen feet from the ground."

There can be no mistaking the implications of this description; Palgrave leaves us in no doubt that he was in the presence of an Arabian "Stonehenge" —a man-made megalithic monument. The opportunity to realize my ambition to see it for myself presented itself during March and April of this year. I was in camp with King Ibn Saud at Buraida and accompanied him on his visit to Hail and back by aeroplane during the last week of March. On the outward and return journeys we flew directly over 'Uyun and I failed to detect any sign of Palgrave's monument. On April 6 therefore I arranged an expedition to 'Uyun by car with the King's Political Secretary, Rushdi Mulhis, who is deeply interested in Arabian archaeology, and we spent a busy day investigating the whole depression of 'Uyun al Ajwa with its three oasis settlements of 'Uyun, Ghaf, and Raudha and the desert plain between them. We were shown everything of interest in the area by the principal citizens of these three villages.

It can be stated categorically that the monument described in such detail by Palgrave does not exist and never has existed; and it is surely a fair inference from that fact that Palgrave never visited 'Uyun. In other words he was deliberately romancing. But why? The question is not difficult to answer from the circumstances of his time. The Paris Geographical Society awarded Palgrave its gold medal, not necessarily for his services to geographical science; but it is on record that the Royal Geographical Society not only declined to honour him with an award but received him coldly, not because it doubted his service to geography but because it was believed that his travels had been sponsored by a foreign Power for motives detrimental to the interests of the British Empire. The France of Napoleon III was at that time (1862–63) seriously interested in establishing a position of exclusive political influence in the Middle East where the great project of the Suez Canal was approaching realization with the help of French capital. It was in that interest that the services of Palgrave had been bespoken by the Emperor, and it would seem that the story of his Arabian travels was designed to provide him with an alibi at a time when he was engaged in political activities which had little connection with geographical exploration.

Palgrave was no fool. On the contrary he was a secret service agent of outstanding ability; and, residing as he did at Damascus, he probably knew more about the Middle East than any of his contemporaries of any nation. At any rate, with his Arabian story he succeeded in fooling most of the world, and if there were a few sceptics like G. P. Badger ready at the time to cast doubt on the

value of his reported travels, nobody took them very seriously: it has taken nearly a century to prove that they were right. Dr. Hogarth was beguiled by the general excellence of Palgrave's information about Arabia into over-rating him as an explorer, and was too ready to brush aside as unimportant the very numerous inaccuracies of detail which disfigure his volumes. I have however always felt that his account of the country was not the work of an eye-witness and was built up at second-hand out of information supplied by Arab agents employed by him in the course of his political work. My recent visit to 'Uyun has not only confirmed that impression but provided some very interesting evidence regarding Palgrave's methods as an armchair explorer. I have no doubt whatever that his account of the megalithic monument faithfully represents the impression left on him by an Arab informant who knew 'Uyun well but had rather fantastic ideas about the significance of its natural features. It may be noted by way of analogy that Badawin legend represented the meteoric craters of Wabar as the remains of an ancient city.

The basin of 'Uyun al Ajwa, some 27½ miles north-west of Buraida on the road to Hail, is a shallow depression almost completely surrounded by the low sandstone escarpment of a desert upland extending from the northern limit of Qasim to the hill region south of Hail. As its name implies, it is—or rather was—supplied by running water from springs whose source is not known to the present inhabitants who say that there has been no flow irrigation in the area during the last five hundred years. The course of one of the old channels can however still be traced by its characteristic man-holes at Ghaf. Water still flows strongly in it and presumably provides the relatively high water-table now operated by draw-wells at a depth of 3 fathoms. The supply is said to be plentiful at all seasons, and the palm-groves of 'Uyun itself are fairly extensive. Ghaf and Raudha, respectively 3 miles north-west and 4 miles west-north-west of 'Uyun, are smaller villages with corresponding areas of cultivation. The total population of the district can scarcely exceed five hundred.

In this rather dull and unprosperous setting occur three groups of natural features which between them appear to have provided the material for Palgrave's megalithic monument: first, Huraisha, a yellow sandstone hill on the west flank of 'Uyun and immediately overlooking it (Plate 1); second, a nameless, isolated hillock of sandstone 2 miles north-west of Huraisha and ¼ mile south-east of Ghaf; and third, Al Hasat 2 miles north-west of Ghaf which forms part of the dark sandstone escarpment encircling the district. The road from Hail comes down through the gap in this ridge by which presumably Palgrave's informant entered the 'Uyun basin; and the first object to attract his attention must have been the remarkable weather-worn rock shown in Plate 2 on which the ancients have left their mark in the form of pictures of ibexes and some Thamudic letters or *wasms*. This object and the broken and eroded ridge of Al Hasat itself may therefore be identified as the "several huge stones" mentioned by Palgrave.

For the "horizontal lintels" he would have had to go about 2 miles to the hillock at Ghaf rising some 50 feet above the surface of the plain. The detached block on the east side of its summit was presumably the "crossbar" which Palgrave pushed with his camel-stick and found to be immovable. He thought it might prove to be a "rocking-stone," for the existence of which in the 'Uyun area he had at least the authority of a local story doubtless retailed to him by his informer. I would add that when I heard the same story at Buraida on the eve of my visit to 'Uyun I began to wonder whether I had been wrong about Palgrave. But my visit to Huraisha was sufficient to dispel my doubts. From the summit of this hill I had a splendid view of the oasis and all the surrounding

1. Huraisha hill from the south

2. Sandstone block north-west of Al Hasat ridge

country; and as I sat there with a crowd from the village they told me the story of how in ancient times some magnate of the village, having decided to build himself a palace of stone, set his workmen the task of sawing off the protruding western block of the hill for the necessary masonry. Having chiselled away a deep but narrow cut between this block and the main body of the hill, they harnessed their ropes to it and summoned all the citizens to help in the pulling which was, alas, in vain. The rock would not budge, though they pulled amain and encouraged each other in the Herculean task with a cry that has become a local proverb: *Al Huraisha taktakat* (Huraisha is rocking!). As will be seen in Plate 1 the coveted block is still in its original position, and the proverb is applied locally to undertakings of a hopeless character.

It will be seen from what I have said that Palgrave, in order to create his Arabian "Stonehenge," had to combine three remarkable natural features, separated from each other by substantial distances, and a local legend. His report of the existence of a megalithic monument in the 'Uyun area is completely baseless. And I leave it to readers of this note to judge whether any eyewitness of the scene, however romantically inclined, could have blundered so egregiously in describing it.

THE NAME KAIETEUR

The name of the Kaieteur waterfall on the Potaro river, British Guiana, has been the subject of occasional correspondence in the *Journal* (see particularly 49 (1917) 388 and 101 (1943) 94), and recently of lively discussion in British Guiana, where many people would prefer the spelling Kaituk. The question was referred to the Permanent Committee on Geographical Names for consideration. The Committee recommended that the spelling Kaieteur be allowed to stand, at least until the Patamona language, to which this name belongs, be satisfactorily reduced to writing. We are informed that the recommendation has been officially accepted. The PCGN memorandum on the question was published in *The Daily Argosy* (Georgetown) on January 20 last. M. A.

OBITUARY

CHARLES WILLIAM HOBLEY, C.M.G.

In the death of C. W. Hobley on 31 March 1947 the Society has lost one of its oldest Fellows and East Africa one of the remaining few who knew it in its early days before the beginning of the century. He first went to Kenya in 1890 on the staff of the British East Africa Company, to investigate its mineral resources. At that time also he made topographical surveys in the coastal region and was one of the pioneer explorers of the Tana river and Mount Kenya.

When the country was transferred to Government control he took his place in the Administrative Service, and in due course became Senior Provincial Commissioner besides occasionally acting as Governor. He retained however his scientific interests and was a constant contributor to the *Geographical Journal* besides publishing his books, 'Bantu beliefs and magic' and 'Kenya: from Chartered Company to Crown Colony: thirty years' exploration and administration in East Africa.' These interests covered a wide field including geography, climatic change, geology, and anthropological studies. In 1910, together with Sir F. Jackson, he founded the Uganda and East African Natural History Society.

In 1915 the Society awarded Hobley the Back Grant for contributions to

geology and ethnology. He became a Fellow in 1922, and served on the Council from 1930 to 1933. In later years after his retirement, he was always present at the Society's African lectures and frequently contributed to the discussions. In addition he took great interest in those of us who added to the early exploration of East Africa by making the scientific studies of the present day. With his death East Africa has lost a great naturalist who loved the country and was one of its greatest protagonists, endeavouring always to inspire everyone with hope for its future. V. E. F.

WILLIAM S. BARCLAY

William Singer Barclay came of a family in which the roving and sporting spirit was a cherished tradition. On his father's side he could trace connection with the Captain Robert Barclay who in 1809 walked 1000 miles in 1000 hours for a wager of £1000; and on his mother's side he was connected with the Captain Henry Wilson of the East India packet *Antelope* who was wrecked in the Pelew Islands in 1783 and afterwards gave to the world the first authentic account of that group and its inhabitants.

W. S. Barclay was born in 1871 and was educated at Bedford School, then as now the Alma Mater of an unusually large proportion of boys drawn from families serving at the ends of the earth and themselves in turn going out to distant lands. On leaving school he went to central Uruguay to join a relative who had contracted to build a railway there. The contract was cancelled and young Barclay was thrown on his own resources. He took the reversal with characteristic cheerfulness, tried his hand for a time at ranching when he came into a little money at the age of twenty-one, and from that passed on to a variety of occupations which in the next twenty years took him into most of the countries of South and Central America, as well as Canada and the United States. These wanderings furnished him with a seemingly inexhaustible store of adventure and anecdote, on which in later life he was always willing to draw for the benefit of his friends. But he was no mere rolling stone and facile raconteur. In all his travels he brought to bear on the scenes through which he passed and the people whom he met an inquiring spirit and a keen analytical mind, coupled with much patient industry in searching out facts. When he thought of taking up writing he went through a correspondence course, and to fit himself for a particular job he took lessons in geographical surveying at the Society.

His first contribution to the Society's *Journal* was an article, "The land of Magellanes," in January 1904. Four years later he was invited to lecture before the Society at an evening meeting, and this lecture in November 1908 on "The River Parana: an economic survey" called forth the appreciation not only of the then President, Major Leonard Darwin, but of Sir Clements Markham, Colonel George Church, and Mr. (later Sir) Follett Holt with whom Barclay was long associated in South American railway enterprises. In recognition of his work in Tierra del Fuego and the Parana Valley he was awarded in 1913 the Back Bequest. In later life, in addition to other services to the Society, he gave two more lectures at evening meetings—in January 1917 on "The geography of South American railways," and in November 1931 on "The basin of the River Parana." In the interval he had increased both his first-hand knowledge of South America and his reputation as an authority on that continent, first as Commercial Secretary to the British Mission to South America under Sir Maurice de Bunsen towards the close of the first world war, and then as General Secretary to the British Empire Trade Exhibition in Buenos Aires, 1929–31.

He was also editor of a monumental commercial map of South America published by George Philip in 1922, and author of a book, 'The land of Magellan,' published in 1926, which was selected for inclusion in the International Catalogue as one of the best six English books of travel for that year. In his last years he was happy in his work as General Secretary of the Tower Hill Improvement Trust.

As a man, Barclay was perhaps best known in the Society to the members of the Kosmos Club, the junior of the two dining clubs limited to Fellows. He had filled the presidential chair, and he remained a valued member of the committee up to the time of his death. There lingers the memory of him in a coterie of friends with a kindred love of travel, joining in the conversation with some whimsical story or shrewd remark, accompanied by a smile of singular charm and ending with a characteristic little laugh. He was a great lover of dogs, and his death was accelerated by his insistence on taking out his dog for a run all through the bitter weather of last winter. S. C. G.

CORRESPONDENCE

MEGALITHIC CORRELATIONS WITH THE LUSITANIAN FLORA

In a note in the October–December number of the *Journal* (108 (1946) 266–7) Mrs. Davies refers to Colonel Stern's suggestion (*Geogr. J.* 108 (1946) 28) that prehistoric navigators of about 2500 B.C. might have brought the Lusitanian flora to Ireland. She puts forward the idea that a connection may exist between the distribution of that flora and that of the unsegmented gallery graves in Ireland.

At a meeting of the British Ecological Society last October (*Journal of Ecology*, 34 (1947) 234) Professor Jessen announced that *Erica mackaii* had been found in post-glacial peat of a period much older than that of any of the megalith builders. This rules out both the suggestions noted above. The full account of Professor Jessen's survey of Irish late-glacial and post-glacial deposits is being published in the *Proceedings* of the Royal Irish Academy. Since 1934 a committee, now one of the permanent committees of the Royal Irish Academy, has been engaged in promoting research into the Quaternary deposits of Ireland. Many results have been published, others are at press and further work is in preparation. Knowledge has advanced greatly since 1932, the latest dated reference to Irish evidence given in Mrs. Davies' note. It should be noted also that the position of *Erica vagans* as an Irish plant has altered recently (*Irish Naturalists' J.* 7 (1938) 3–5). A. FARRINGTON.

13 *June* 1947.

GEOGRAPHY AND ITS COMPONENTS

It is only during this vacation that I have had an opportunity of catching up with my reading of the *Journal* and I have just read the correspondence from Professor Fitzgerald on the recent Questionnaire (107 (1946) 272). I agree with him wholeheartedly in his criticism of the use of the terms "Human Geography" (which, to one of the late Professor Lyde's way of thinking, suggests opposites such as "Inhuman Geography" and "Divine Geography"), "Economic Geo-

graphy" (which so many interpret as "Commercial Geography"), and "Social Geography."

Geography to my mind is not so much a subject or branch of study as an attitude to, a way of thinking about, certain phenomena in their relation to mankind or mankind in relation to these phenomena. As in all studies, the emphasis is placed sometimes on one aspect and sometimes on another, but the well-trained geographer does not neglect any aspect. "The complete geographer is a man of wide learning and field experience" (*Geogr. J.* 107 (1946) 242). "Human Geography" is therefore to me a quite inappropriate term for that aspect of Geography which concerns "man's life and work" since all geographical studies do (or should do) just that. River action as such is not Geography; it becomes so when it is studied in its relation to man. And so with other branches. Geography is *one* and as soon as we begin to break it up for specialist or other study, it begins to disintegrate and we are left with the crumbs of a multitude of "sciences" minus the outlook which is the chief justification for the existence of this branch of study: " 'Hamlet' without the Prince." If a qualifying word is required for the purpose of emphasizing "human reaction to given environments," I cannot think of anything better than "social," which is an omnibus term for "economic," "commercial," "political," etc.

With regard to "Historical Geography," I do not accept the definition as "the geography, both physical and humanistic, of past times." I have always thought about Historical Geography as "the geographical interpretation of historical events." I consider the stimulating lecture by Sir Leonard Woolley in this same number of the *Journal* to be a perfect example of what I mean by "Historical Geography."

W. L. HANDYSIDE.

11 *August* 1947.

I was delighted to read the letter from Mr. Tom Harrisson (*Geogr. J.* 108 (1946) 126) with its emphasis on the significance of Social Geography as well as on the links between Geography and Sociology. While fully appreciating the physical basis of our subject it is surely in the field of the Social Sciences that Geography ultimately has one of its most fruitful fields of development.

I should like, if I may, to refer to just one point arising from this letter which illustrates the urgent need for more precise terminology among geographers. Thus the word "geographical" itself is very overworked as may be seen in Mr. Harrisson's phrase regarding "social, topographical, and geographical factors." Presumably the word here means "physical" as it does in the great majority of cases, although this is not at all clear since "topographical" is also used. I would plead for a closer definition among geographers of many of the terms we frequently use.

R. H. KINVIG.

CONTEMPORARY EUSTATIC RISE IN SEA-LEVEL?

Dr. R. W. Fairbridge has kindly sent me an advance copy of his note on this subject. While I find myself in complete agreement with the substance of Dr. Fairbridge's conclusions, it might be of interest to add a few words about the evidence on which these conclusions are based.

Pelsart Island, one of the largest islands of the Abrolhos group, or Houtman's Abrolhos, off the coast of Western Australia at about lat. 29° S., consists very largely of a system of beach ridges composed mainly of coral fragments. Various

lines of evidence suggest that these beach ridges have been formed during the last thousand to one thousand five hundred years and that the outermost, youngest beach ridge which lines the coast for more than 7 miles is older than one hundred years. Everything points to the formation of these beach ridges during a period of slow and more or less gradual subsidence of sea-level, presumably following the early to mid-Recent climatic optimum. With local exceptions beach ridge formation ceased, probably slightly more than one hundred years ago, and the youngest beach ridges are now subjected to erosion by the sea as can be clearly observed everywhere along the east coast of Pelsart Island. This suggests at least a standstill, more probably a contemporaneous rise of the level of the sea.

A set of factors combines to make the coast and shelf of south-western Australia almost uniquely important for the study of eustatic phenomena. First, we have here one of the ancient stable nuclei of the earth's crust whose isostatic equilibrium has not been disturbed either by a load of Pleistocene ice, as that of the Fennoscandian and Canadian shields, or by intense river erosion, for the Western Australian peneplain is of ancient origin and much of its present drainage is internal. Second, much of the coast of south-western Australia is lined by generally fairly soft limestones, partly marine, partly aeolian, of Pleistocene age and many islands on the shelf consist of the same material in which even slight and short-lived changes in the position of sea-level are quickly and accurately recorded as platforms, benches, or undercut notches. Along exposed parts of the coast such marks have been obliterated by later change. In protected bays or along lakes formerly connected with the sea successive erosion levels have been preserved in great perfection. This is the case along the shores of the present salt lakes of Rottnest Island off Fremantle at about lat. 32° S., where an old valley between Pleistocene calcareous dunes was drowned by the post-glacial rise of the sea and subsequently converted into a chain of lakes by the mid-Recent eustatic subsidence (see C. Teichert, "Late Quaternary changes of sea-level on Rottnest Island, Western Australia," *Proc. Roy. Soc. Victoria*, in press). It was here that I first recognized the presence of definite erosion levels at about 10, 5, and 2 feet above present low water-level.

Western Australia thus provides a natural eustatic gauge, equipped with a sensitive recording material. More intensive studies of the coastal physiography of Western Australia such as are now being ably prosecuted by Dr. Fairbridge are bound to result in a better understanding of eustatic movements during the Late Quaternary, especially the Recent, period. C. TEICHERT.

6 *May* 1947.

MEETINGS: SESSION 1946–47

Twenty-second Meeting, 14 April 1947

Films: Kenya Tribes. Kodachrome films with commentary by Mr. A. M. Champion

Twenty-third Meeting, 26 April 1947. The President in the Chair

Paper: Visual aids in geographical teaching. By Miss M. Simpson, Mr. H. Bruce-Woolfe, and Mr. G. J. Cons

Twenty-fourth Meeting, 28 April 1947. The President in the Chair

Elections to Fellowship: Dr. Patrick Butler Adamson; Edet Offiong Ani; Purnendu Kumar Banerjee, M.A., B.L.; Commander John Henry Biggs, C.B.E., R.D., R.N.R.(ret.); Visuvalingam Chuppiramaniam, B.SC.; Major Patrick David Channer Davis; Captain Charles Edmund Gower; Claude James Poingdestre Guille, O.B.E.; Frank Ernest Hayter; Arthur Henry Hodson; Captain Michael Ayerst Hooker, B.A.; Bruno Jablonsky; Lionel Alexander Lucian Jarvis; Hugh Philip Hewitt Johnson, B.A.; Noel Llewellyn Jones; Charles Keefe; Captain J. A. McCance; Thomson Macniven; J. R. Martyn, B.A.; Eric Marx; Derek Charles Pugh, B.SC.; Bibhudan Roy; Lieutenant Desmond Edward Patrick Dehany Scott, R.N.; Horace Barrett Smith, M.A.; George Herbert Spencer; Captain P. C. Thomas; Charles David Lachlan Wharry; John Ascroft Whittaker; The Rev. Laurence William Wray

Elections to Associate Membership: Ian Peter Brown; Kenneth Geoffrey Ian Hart; Angus Davidson Hewat; John William Michael Smith

Paper: The Eskimos of east Greenland. By Captain Ejnar Mikkelsen

Twenty-fifth Meeting, 5 May 1947

Films: Captured German films. With commentary by Miss M. Simpson

Twenty-sixth Meeting, 12 May 1947. Professor E. G. R. Taylor in the Chair

Paper: The history of the atlas. By Miss E. M. J. Campbell

Twenty-seventh Meeting, 19 May 1947

Films: Round Afghanistan. Kodachrome films with commentary by H.R.H. Prince Peter of Greece

Twenty-eighth Meeting, 2 June 1947. The President in the Chair

Elections to Fellowship: Mrs. Sheila Mary Adamson; F/Lt. L. F. Banks, R.A.F.; Geoffrey Belshaw; William Henry Briggs; Major John Bromhead; Alec Francis Carter, B.SC.; Sub-Lieut. Simon Alastair Cassillis Cassels; The Rt. Hon. The Viscount Chaplin; Walter Christopher Chapman, M.A.; Miss Jean Clayton; Richard George Bulmer Davis; John Robert Stratford Dugdale; Miss Mary Amelia Everett, B.A.; Major C. G. Ferguson, M.C.; Samuel H. Fisher; Peter Douglas Lionel Ford, M.A.; Captain Gerald Thomas Gabe; Wilfrid Penrose Gamble; Alfred John Garrett, M.A.; Robert Douglas Godfrey; Charles Haller, J.P.; Clifford Halstead; Peter Brellisford Hardyman-Jones; The Rev. Harold Dewey Hayward, B.SC., B.D., TH.D.; A. J. Hill, B.A.; Brian Jones; Granville Knowles; Miss Patricia Mary Lindsay; Anthony John Manley; Kelvyn Tavistock Manning-Cocking; Alfred Herbert Mansford; John J. W. Parker; Leonard Geoffrey Pass; Major R. E. Polendine; Carl Oscar Richards; Wing Commander Paul Henry Mills Richey, D.F.C.; Miss Inès Sandars; Major Clifford Spencer-Cooke; Major-General William George Stevens; Miss Ena

Joan Thomas; Geoffrey Michael Graydon Tibbs; John William Tyler; Anthony Knighton Weston Weston-Webb; George Tom Willey; Laurence Henry Williams; Major Michael John Wise, M.C., B.A.; Miss Isabel Vivien Young

Elections to Associate Membership: Cyril Ernest Everard; Miss Anne Faulkner; Gordon Wright Fowler; John Hargreaves; Miss Patricia Marguerite Hillebrandt; Miss Kathleen Hourd; Miss Dilys M. Hunt; Miss Margaret Eleanor Lawes; Miss Mary J. Lonergan; Miss Frances Pilling; Charles Walter Peter Montgomery Redway; Kenneth E. Sawyer; Anthony Edward Vine

Paper: Whaling in the Antarctic 1946–47. By Mr. John Grierson

ANNUAL GENERAL MEETING, 16 June 1947. The PRESIDENT, The Right Hon. The Lord Rennell of Rodd, in the Chair.

The HON. SECRETARY, Mr. Leonard Brooks, read the Minutes of the Annual General Meeting held on 24 June 1946, which were confirmed and signed by the President.

The PRESIDENT then said: My first duty this afternoon is to present the Medals and Awards. For the first time for many years the Royal Mint has been able to strike the two Royal Medals—the Patron's Medal and the Founder's Medal—in gold. I wish that the same could be true of the Victoria Medal which the Society, as in former years, must present in bronze.

His Majesty the King has approved the award of the Patron's Medal to Colonel Daniel van der Meulen for his contributions to the geography, archaeology, and ethnography of southern Arabia. As a member of the Netherlands East Indies' civil service he was appointed Chargé d'Affaires at Jidda, an important post in view of the long and close connection between Arabia and the East Indies. It was natural therefore that his attention should be drawn to the Hadhramaut, and in 1931 and 1939 he organized and led, in company with von Wissman, two expeditions to that little-known region. These expeditions resulted in the first adequate maps of the Hadhramaut and much information on its peoples and their history. As Colonel van der Meulen is still serving in the East Indies, I will ask the Netherlands Consul, M. N. Brat, to accept this Patron's Medal on his behalf as a token of our warm appreciation of his achievements.

The NETHERLANDS CONSUL (M. N. Brat) accepted the Patron's Medal on behalf of Colonel van der Meulen.

The PRESIDENT: With the approval of His Majesty the King, the Founder's Medal has been awarded to Brigadier Martin Hotine, C.B.E., Director of Colonial Surveys. During the war Brigadier Hotine was Director of Military Surveys and was responsible for meeting the very heavy demands of the armed forces for cartographic material of all kinds. In meeting those demands he promoted the development of methods of mapping from air photographs on which for many years he has been a recognized authority. He has also been responsible for important geodetic work in connection with the East African Arc of Meridian and the re-triangulation of Great Britain. He is therefore eminently equipped for his present appointment as first Director of Colonial Surveys. It is a matter of great satisfaction to our Society that the importance of accurate topographical surveys for the development of the colonial territories has been adequately recognized and means for their execution provided.

Brigadier MARTIN HOTINE received the Founder's Medal from the President.

The PRESIDENT: The Council have awarded the Victoria Medal for 1947 to Professor E. G. R. Taylor, Emeritus Professor of Geography in the University of London and the first woman to gain this high award in the history of the

Society. Fellows of the Society will be aware of Professor Taylor's many and varied contributions to the advancement of geographical knowledge, many of which have appeared in the pages of the *Geographical Journal*. Her geographical outlook is wide ranging and has been applied with equal insight and vigour to elucidating the geographical thought of the Tudors, to clarifying the geographical basis of the location of industry, to securing the recognition of the value of a National Atlas of Great Britain, and to other problems of national and global geography. To her scholarship and research she adds the ability to impart in clear and forthright terms the contribution which geography can make to an understanding of this changing world. I ask Professor Taylor to accept the Victoria Medal and to mark the occasion of this award by saying a few words.

Professor E. G. R. TAYLOR: Mr. President, even if I had not been specially invited to do so I had intended to say a few words because we did not hear from the two gentlemen before me the accustomed speeches to which we look forward on these occasions.

I am greatly honoured by the award of this Victoria Medal and yet a little surprised because my rôle in the Society has often been the ungracious one of critic. But it gives me special pleasure to receive the Victoria Medal because thereby my name is linked with some very distinguished holders of the same Medal in the past. I should like to mention Mr. Edward Heawood and Mr. Arthur Hinks, who in different ways did so much for cartography which is the very basis of our work. Then I should like also to mention my teacher and inspirer, Sir Halford Mackinder. On this occasion two years ago Sir Halford told us how he hastened across Africa and climbed Kilimanjaro so that the important things he had to say about geography and world affairs in the autumn of 1899 should be better listened to. We are at the moment witnessing that pressure of the heartland on the periphery about which he spoke. The curious thing to my mind is that our politicians are attempting to counter geographical realities by moral indignation.

The PRESIDENT: The Murchison Grant for 1947 is awarded by the Council to Mr. Gordon Manley, a past President of the Royal Meteorological Society and Lecturer in Climatology in the University of Cambridge. Mr. Manley, who has had experience as a meteorologist in east Greenland, has for many years concentrated upon two aspects of his science which are of much interest to British geographers, the climates of our mountain regions and the extent and duration of the snow cover in Britain. The organization and collection of these observations have required much enthusiasm and determination, and we hope that by this award he will be encouraged to continue and develop these valuable researches.

Mr. GORDON MANLEY: My Lord President, Ladies and Gentlemen, I am indeed highly honoured by this award on the part of the Council of the Royal Geographical Society. I feel it the more because I think it will offer encouragein a field where geographers might labour with profit. After all, there is much room for the observations and interpretations of the geographer before the physicist can get to work. Nevertheless those like myself who put observations together have ultimately to thank many others for the field work. In particular, I have in mind Mrs. Phyllis Wager and her colleagues who maintained with determined assiduity a very fine series of meteorological observations in east Greenland on which a considerable amount of work has depended. I take the opportunity of thanking her and many others for the help they have given me. I should like also to express my thanks to Professor Debenham for putting me on the polar track a long time ago and to the Honorary Secretary of the Society, Mr. Wordie, for letting me experience something of the Greenland weather.

The PRESIDENT: The Council have awarded the Back Grant for 1946 and 1947 to Lieut.-Colonel Andrew Croft, D.S.O., for his work in the Arctic. Colonel Croft is a leading authority on the technique of arctic travel. In 1934 he was a member of Colonel Martin Lindsay's trans-Greenland expedition, and in 1935–36 he did important work as second-in-command in organizing and carrying through the Oxford University Expedition to Spitsbergen. The experience gained was of great value during the late war, and in his capacity as military observer Colonel Croft contributed much to the success of Exercise Muskox in northern Canada last year.

Lieut.-Colonel ANDREW CROFT: It is indeed a great compliment that what little I have been able to do towards furthering geographical knowledge has been noticed in this most delightful and, for me, unexpected manner by the Society.

Of the three winter expeditions which the President mentioned, the Greenland one was the most arduous and exciting because it was rather a one-way passage; the North-East Land one was the most complicated and involved a considerable amount of research, and Muskox was certainly the most comfortable. I should like to take this opportunity, Mr. President, of saying how much we appreciate the initiative taken by the Society in these extremely difficult days and to express the hope that this country will continue to lead in research and exploration, working in close collaboration with other countries.

The PRESIDENT: The Cuthbert Peek Grant for 1946 goes to Mr. John Wright for his surveys in the Arctic and in North Africa. Between 1934 and 1939 he was surveyor on expeditions to Iceland, Spitsbergen, and Ellesmere Island and contributed the results of his experiences in several papers in the *Geographical Journal*. As an officer in the Sudan Defence Force during the war he explored and surveyed portions of the central Libyan desert. You will agree that Libya and the Arctic form two great extremes of experience.

Mr. JOHN WRIGHT: Mr. President, Ladies and Gentlemen, I feel very honoured and grateful to the Society for giving me this grant, but I should like to say that I owe an even greater debt of gratitude to the Society for the support it gave me at the time of going on those expeditions. It is the grants which the Society makes and the support it gives with instruments and by publishing results in the Society's *Journal* that count more than any award given afterwards.

You said, sir, that Libya and the Arctic formed two great extremes but they do have one thing in common: they are both deserts where nobody lives and nobody, I suppose, really wants to go—except the members of this Society. Thanks to the Society, I have been able to help in the closing stages of what to surveyors is a very important epoch which began four or five thousand years ago during which the great uninhabited areas have been explored. We shall not have to explore the ground in that way any more. Through the work done during the war, under Brigadier Hotine's direction particularly, the surveying can be done from radar-controlled air photographs without the need to establish control on the ground, as you have read in a recent number of the *Journal*.

The PRESIDENT: The Cuthbert Peek Grant for 1947 is awarded to M. André Guibaut, Consul-General of France in Singapore, for his journeys in the Chinese–Tibetan borderlands. In 1936–37, accompanied by Louis Liotard, he explored and mapped a hitherto unmapped portion of the central Salween valley, and three years later they journeyed into the country of the Ngolo-Setas north of Tatsienlu. On this journey Liotard was killed by bandits, and it was only with great difficulty that Guibaut was able to recover the details of their reconnaissance of the unexplored upper Tung basin. We are glad to know that M. Guibaut proposes to make further journeys in this region when opportunity

offers. As M. Guibaut is at present in Singapore I will ask the French Chargé d'Affaires, M. Paris, to receive the Grant on his behalf.

THE FRENCH CHARGÉ D'AFFAIRES (M. J.-C. Paris): It is, Mr. President, a very great honour for me to accept the Cuthbert Peek Grant on behalf of my countryman, André Guibaut. I should like to take this opportunity to stress the advantages both our countries can derive from sharing our geographical knowledge. At the Embassy we are willing and ready to arrange visits to this country for our most distinguished geographers who would consider it a great honour to address this learned Society and resume their former contacts with you, for we have much to learn from you.

The PRESIDENT: The Gill Memorial for 1947 has been awarded to Commander K. St. B. Collins, O.B.E., D.F.C., R.N., for his bathymetric surveys. During the war, Commander Collins carried out surveys between Scotland and Iceland and in Denmark Strait in difficult circumstances and in the face of enemy attacks. This work provided valuable data on the configuration of the sea bed and we hope that these will soon be available. Commander Collins is at present serving at sea and I will ask the Hydrographer of the Navy, Rear-Admiral Wyatt, to accept the award on his behalf.

The HYDROGRAPHER OF THE NAVY (Rear-Admiral A. G. N. WYATT): My Lord President, Members of the Council and Fellows, Commander Collins has asked me to express his great regret at not being able to be present this afternoon and to thank you most sincerely for the honour which you have done him. Commander Collins and those under his command worked under rather peculiar difficulties in obtaining these soundings: not only was the weather bad that year but also they were a sitting target for any marauding submarine and they frequently experienced the unwelcome attentions of enemy aircraft. I should also like to express my thanks to you as Hydrographer of the Navy because I feel that this honour is also conferred on the Navy.

The PRESIDENT then delivered the Presidential Address, which is printed on pp. 161–4.

Visitors then withdrew and the PRESIDENT appointed Miss A. Balthazar and Mr. C. E. A. W. Oldham to act as scrutineers of the ballot for the Council and Officers for the ensuing year.

The PRESIDENT: It is now my duty to present the Annual Report of the Council for the year 1946. While it is in your hands I should like to add a few words in regard to the financial and economic position of the Society. At the Annual General Meeting last year I went into the position of the Society after the end of the war at considerable length. I do not propose to do so again to-day, but I must refer briefly to one or two developments.

The net increase of 328 Fellows in the year 1946 represents the largest increase in the Fellowship in any one year which the Society has enjoyed recently. Since the end of 1946 the Fellowship has risen further to over 5,500. But we are still a long way from the pre-war maximum figure of 6,452 attained in December 1937. The recent increase, though satisfactory, does not provide sufficient income to overtake the rising costs of administering the Society in all its various activities. I must therefore again urge all Fellows individually to propose suitable candidates for Fellowship to help maintain the Society in future years.

The number of Fellows who have compounded their annual subscriptions by a life composition fee has been very considerable. This means that in future years the Society will not benefit by their annual subscriptions while incurring a liability to them for the privileges and amenities conferred by Fellowship. Your Council therefore decided that life composition fees cannot be treated as

current income and must be set aside as an investment reserve to meet these liabilities. This has been done in the last two years but, with the low rates of interest obtaining on investment funds, the income derived from these life composition fees is not nearly as great as the sum of annual subscriptions lost. These circumstances have obliged your Council to raise the scale of life composition fees in conformity with those of other learned societies which are experiencing the same difficulties.

Since the last Annual General Meeting your Society has received a generous bequest of £100 from the late Mrs. Charlotte Cameron.

A very satisfactory development reflected in the balance sheet of the Society is the substantial increase in the sales of the Society's publications, covering not only sales of the *Journal* to persons other than Fellows but also the sales of 'Hints to travellers,' maps, and miscellaneous publications of the Society.

The Annual Report of the Council was adopted on the motion of Mr. Corbet Milward seconded by Captain The Rev. H. Basham.

The scrutineers informed the President that the list of candidates proposed as Council and Officers for the ensuing year had been elected (see list, volume preliminary, following title-page).

The Rt. Hon. Sir GEORGE CLERK: Before we disperse I feel sure that Fellows of the Society will agree with me that we owe a hearty vote of thanks to our President. The way in which he has devoted himself to restoring our position and our work to what it was before the war is beyond praise. I should like, in your name, to propose a vote of thanks to him both for that and for his conduct in the chair today.

Field-Marshal Lord CHETWODE: As another past President, I should like to second that motion. (*Applause.*)

The PRESIDENT: Ladies and Gentlemen, it is a very great pleasure to me to feel that what I have done has merited your thanks. Without the support I have received from the staff of the Society and on the Council it would not have been possible, and I should like you to give the thanks you have offered me to them equally.

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